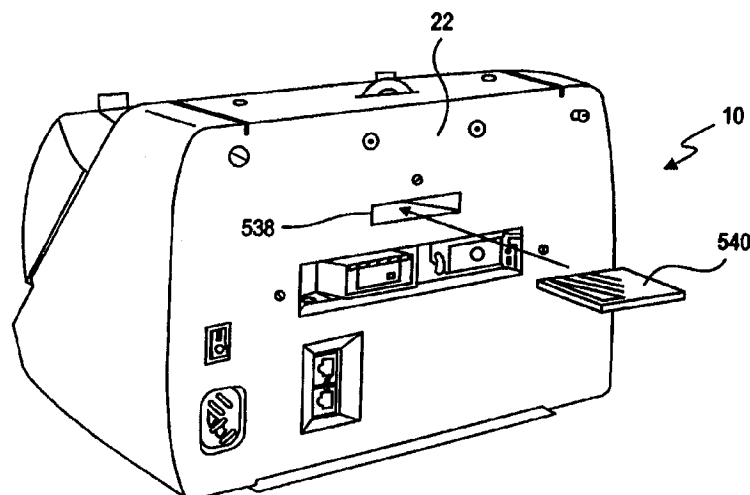




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(54) Title: SOFTWARE LOADING SYSTEM FOR A CASH SETTLEMENT DEVICE



(57) Abstract

An apparatus and method for loading software changes into a cash settlement machine (10). In one embodiment, a flash card (540) having a memory remotely programmed with a second software code is adapted to be electrically coupled to the cash settlement machine (10). Insertion of the flash card (540) causes the initial code in the resident memory of the machine (10) to become erased and replaced with the second software code. The flash card (540) may thereafter be removed from the machine (10) and used to load software changes into other machines. In another embodiment, the flash card (540) is adapted to be inserted and remain electrically coupled to the cash settlement machine (10). Insertion of the flash card (540) causes the machine (10) to execute the second software code, but the initial code is not erased or replaced. Upon removal of the flash card (540), the machine (10) does not retain the second software code but will revert to execution of the initial code.

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SOFTWARE LOADING SYSTEM FOR A CASH SETTLEMENT DEVICE

FIELD OF THE INVENTION

The present invention relates generally to the field of cash settlement machines and, more particularly, to a method and apparatus that permits quick and efficient loading of software or software upgrades into cash settlement machines.

5 BACKGROUND OF THE INVENTION

Cash settlement machines are used to gather and record data relating to monetary transactions. Generally, the operator of the cash settlement machine is a supervisor who is interested in the value of transactions performed by subordinates interacting with consumers at a transaction station. The cash settlement machine records various financial
10 data such as cash, coins, credit card receipts, coupons and other related data from each station. The data can be input into the cash settlement machine manually or automatically via numerous peripheral machines communicating with the cash settlement machine such as coin sorters, cash scanners and counters, and bar code readers. The operator reviews the financial data which the cash settlement machine has recorded and reconciles it with the
15 amount declared by the subordinate.

The cash settlement machine also permits the operator to manipulate the data. For example, daily totals for each station or all stations can be established. The total of only coins from one station can be displayed. And, numerous other functions similar to these illustrative examples can be executed. Functions directed to the unique requirements of an
20 operator or an industry can also be utilized.

Cash settlement machines known in the art typically include a system memory for storing operating parameters including control software and information concerning various transactions occurring at the machine. Although these parameters may remain fixed for relatively long periods of time, they must be updated periodically in order to reflect the
25 most recent control software, for example. Cash settlement machines heretofore known in the art have employed memory devices such as erasable programmable read only memories (EPROMs) for this purpose because they are unalterable by a user but are capable of being erased and electrically reprogrammed.

However, in order to erase an EPROM chip, it must be removed from its position within the machine and exposed to an ultraviolet light for about 20 minutes. Because EPROM chips are sensitive to mechanical and electrostatic damage, the removal, erase process, reprogramming and replacement of the chips can generally be accomplished only
5 by trained service personnel. In particular, mechanical damage to the chip is likely to occur during the removal process unless special tools are used to pry the chip from its socket within the machine. Once removed from the machine, EPROM chips are typically shipped to an off-site service center to be erased. Because of their sensitivity to damage, they must be shipped in special containers to protect them from mechanical and electrostatic damage.
10 The chips are erased and reprogrammed at the service center and delivered to the customer, where they are reinstalled in the machines by trained service personnel.

Accordingly, there is a need for a software loading system that enables users of cash settlement machines to more quickly and easily update the system memory of their machines. The system should enable users to update their system software without any
15 special training and without requiring trained service personnel to remove, erase, reprogram and replace the system memory from the machine. The present invention is directed to providing a software loading system for a cash settlement machine that overcomes or at least reduces the effects of one or more of the problems set forth above.

SUMMARY OF THE INVENTION

20 In accordance with one aspect of the present invention, there is provided an apparatus and method for loading software into a cash settlement machine. A resident memory within the machine contains an initial software code to be executed by the controller. The resident memory may be housed in a ZIF-type socket or equivalent to facilitate installation and removal of the resident memory. The initial software code
25 includes operational control software and a first set of master characteristic patterns corresponding to the different denominations of bills to be evaluated by the cash settlement machine. A flash card remote from the machine is programmed with an updated software code including a second set of master characteristic patterns corresponding to updated parameters of the different denominations of bills to be evaluated. The flash card
30 containing the updated software code is adapted to be removably plugged into the cash settlement machine. In response to the flash card being plugged into the machine, the initial software code in the resident memory of the machine is erased and replaced with the

3

updated software code from the flash card. When the flash card is subsequently removed from the machine, the resident memory retains the updated software code. The flash card may thereafter be plugged into and removed from a series of additional machines to upgrade the software of the additional machines.

5 In accordance with an alternate embodiment of the present invention, there is provided another method and apparatus for loading software into a cash settlement machine. A resident memory within the machine contains an initial software code to be executed by the controller. The resident memory may be housed in a ZIF-type socket or equivalent to facilitate installation and removal of the resident memory. The initial
10 software code includes operational control software and a first set of master characteristic patterns corresponding to the different denominations of bills to be evaluated by the cash settlement machine. A flash card remote from the machine is programmed with an updated software code including a second set of master characteristic patterns corresponding to updated parameters of the different denominations of bills to be evaluated. The flash card
15 containing the updated software code is adapted to be plugged into the cash settlement machine. In response to the flash card being plugged into the machine, the resident memory of the machine executes the updated software code from the flash card, but the initial software code is not erased or replaced. Upon removal of the flash card from the machine, the resident memory reverts to execution of the initial software code.

20 BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings in which:

FIG. 1a is a front view of a cash settlement machine with a touch screen device;

FIG. 1b is a profile view of a cash settlement machine with a touch screen device;

25 FIG. 2a is an illustration of the mechanical keyboard in a typical cash settlement machine;

FIG. 2b is a perspective view of the touch screen device.

FIG. 3 is a block diagram of a cash settlement machine having a software loading capability according to one embodiment of the present invention;

30 FIGs. 4 and 5 are cross sectional views of ZIF-type sockets which may be used to house the resident memory of the present invention;

FIG. 6 is an isometric view depicting the insertion of a flash card into an external slot on a cash settlement machine according to one embodiment of the present invention;

FIG. 7 is an isometric view depicting a socket for accepting a flash card according to one embodiment of the present invention;

5 FIG. 8a is a block diagram of a cash settlement machine having a software loading capability according to another embodiment of the present invention;

FIG. 8b is a flowchart showing the memory cloning operation according to the present invention;

FIG. 9 is an illustration of the graphics display in the basic operating mode with the
10 supplemental mode display keys;

FIGS. 10a and 10b illustrate the flow diagram of the HELP mode;

FIG. 11 is an illustration of the graphics display in the HELP mode directing the operator to edit the help mode information or example;

FIG. 12a is an illustration of the graphics display in the HELP mode wherein lower
15 case alpha characters display keys are activated;

FIG. 12b is an illustration of the graphics display in the HELP mode wherein upper case alpha characters display keys are activated;

FIG. 12c is an illustration of the graphics display in the HELP mode wherein symbol characters display keys are activated;

20 FIGS. 13a and 13b illustrate the flow diagram of the DIRECTORY mode;

FIG. 14 is an illustration of the graphics display in the DIRECTORY mode wherein the output of a numerical sequence search is shown;

FIG. 15 is an illustration of the graphics display in the DIRECTORY mode wherein detailed register information is shown;

25 FIG. 16 is an illustration of the graphics display in the DIRECTORY mode wherein the operator enters a word to be searched in the register;

FIG. 17 is an illustration of the graphics display in the DIRECTORY mode wherein the output of a word search is shown;

FIGS. 18a and 18b illustrate the flow diagram of the DIAGNOSTICS mode;

30 FIG. 19 is an illustration of the port communication status in the DIAGNOSTICS mode;

FIGS. 20a and 20b illustrate the flow diagram of the SCREEN FORMAT mode;

FIG. 21 is an illustration of the graphics display wherein the operator is modifying the character format in the SCREEN FORMAT mode;

FIGS. 22a and 22b illustrate the flow diagram of the REPORTS mode;

FIG. 23 is an illustration of the graphics display wherein the operator is modifying
5 the print format in the REPORTS mode;

FIGS. 24a and 24b illustrate the flow diagram of the SET-UP mode;

FIG. 25 is an illustration of the graphics display wherein the operator is initializing a port in the SET-UP mode; and

FIG. 26 is an illustration of the graphics display wherein the touch screen device
10 includes all the display keys from the mechanical keyboard.

While the invention is susceptible to various modifications and alternative forms, specific embodiments have been shown by way of example in the drawings and will be described in detail herein. However, it should be understood that the invention is not intended to be limited to the particular forms disclosed. Rather, the invention is to cover all
15 modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIGS. 1a and 1b illustrate a typical cash settlement machine (CSM) 10. The CSM 10 includes a monitor portion 12 and a keyboard portion 14 which are generally integral at
20 the base of the monitor portion 12. The monitor portion 12 contains a graphics display 16 which is located above and adjacent the keyboard portion 14. The keyboard portion 14 contains a plurality of keys 18 comprising a mechanical keyboard 20. Generally, the monitor portion 12 and the keyboard portion 14 are encased in a common housing 22 except over the mechanical keyboard 20 and the graphics display 16.

25 Referring specifically to FIG. 1b, the monitor portion 12 contains a controller 24 which operably couples the mechanical keyboard 20 to the graphics display 16. Generally, the controller 24 is a microprocessor. As the operator depresses one of the keys 18, a key base 19 contacts a keypad 26. Typically, the keypad 26 sends a signal to the system controller 24 via a signal path 28 corresponding to the depressed key 18. Depending on
30 which key the operator depresses, the system controller 24 then alters the data displayed on the graphics display 16 or performs a function associated with the depressed key 18. The monitor portion 12 also contains a region for communication ports 29 to which peripheral

devices are connected for interaction with the controller 24. Generally, these ports will be RS232 communication ports. In addition to the mechanical keyboard 20, the operator interacts with the system controller 24 through a touch screen I/O device 30 which includes a touch screen 32 mounted over the graphics display 16 for sending signals to the controller

5 24.

Referring now to FIG. 1b, a typical mechanical keyboard 20 is illustrated with five key groupings. A basic functional group 34 includes function keys, such as totaling functions, and monetary media keys, such as the coin key, which most industries utilizing a CSM 10 require. A variable function group 35 is illustrated as keys labeled F1-F6. The

10 operator has the capability of defining these variable functions such that the keyboard can be customized to suit the specific needs of that operator. A numerical group 36 is also included. A process group 37 allows the operator to start sessions, input data, print data, and verify functions. Finally, a monetary group 38 allows the operator to manually enter the amount of various coins or currency. These key groupings represent the most

15 commonly used functions and are ergonomically positioned to permit easy interaction with the CSM 10.

Referring now to FIG. 2a, a typical mechanical keyboard 20 is illustrated with five key groupings. A basic functional group 34 includes function keys, such as totaling functions, and monetary media keys, such as the coin key, which most industries utilizing a

20 CSM 10 require. A variable function group 35 is illustrated as keys labeled F1-F6. The operator has the capability of defining these variable functions such that the keyboard can be customized to suit the specific needs of that operator. A numerical group 36 is also included. A process group 37 allows the operator to start sessions, input data, print data, and verify functions. Finally, a monetary group 38 allows the operator to manually enter

25 the amount of various coins or currency. These key groupings represent the most commonly used functions and are ergonomically positioned to permit easy interaction with the CSM 10.

Referring now to FIG. 2b, the touch screen I/O device 30 is illustrated to show its matrix structure and positioning over the graphics display 16. In one embodiment, the

30 display 16 is a liquid crystal display (LCD) with 128 vertical pixels and 256 horizontal pixels that utilizes backlighting. The display 16 contains a built-in character generator which permits the display 16 to display text and numbers having a font and size pre-defined

by the display manufacturer. Moreover, the controller 24 is programmed to permit the loading and display of custom fonts and shapes (e.g., key outlines) on the display 16. The display 16 is commercially available from Stanley Electric Company, Ltd., Equipment Export Section, of Tokyo, Japan.

5 In one embodiment, the touch screen 32 is an X-Y matrix touch screen forming a matrix of touch responsive points. The touch screen 32 includes two closely spaced, but normally separated layers of optical grade polyester film each having a set of parallel transparent conductors. The sets of conductors in the two spaced polyester sheets are oriented at right angles to each other so when superimposed they form a grid. Along the
10 outside edge of each polyester layer is a bus which interconnects the conductors supported on that layer. In this manner, electrical signals from the conductors are transmitted to the controller 24. When pressure from a finger or stylus is applied to the upper polyester layer, the set of conductors mounted to the upper layer is deflected downward into contact with the set of conductors mounted to the lower polyester layer. The contact between these sets
15 of conductors acts as a mechanical closure of a switch element to complete an electrical circuit. The controller 24 detects the closure through the respective buses at the edges of the two polyester layers thereby providing a means for detecting the X and Y coordinates of the switch closure. A matrix touch screen 32 of the above type is commercially available from Dynapro Thin Film Products, Inc. of Milwaukee, Wisconsin. As illustrated in FIG. 3,
20 the touch screen 32 forms a matrix of optically transparent switches having X columns and Y rows. If desired, the controller 24 may be programmed to combine one or more adjacent switch elements into a single switch, such that activation of any of the combined switch elements activates the function associated with that switch.

 Although the touch screen 32 uses an X-Y matrix of optically transparent switches
25 to detect the location of a touch, alternative types of touch screens may be substituted for the touch screen 32. These alternative touch screens use such well-known techniques as crossed beams of infrared light, acoustic surface waves, capacitance sensing, and resistive membranes to detect the location of a touch. The structure and operation of the alternative touch screens are described and illustrated, for example, in U.S. Patent Nos. 5,317,140;
30 5,297,030; 5,231,381; 5,198,976; 5,184,115; 5,105,186; 4,931,782; 4,928,094; 4,851,616; 4,811,004; 4,806,709; and 4,782,328, which are incorporated herein by reference.

The controller 24 is programmed to display various sets of "keys" on the display 16. A key is preferably displayed on the display 16 in the form of either an asterisk "*" or key outline. If the key is displayed as an asterisk "*", a key legend defining the function of the key is positioned adjacent the asterisk "*" on the display 16. If the key is displayed as an outline (e.g., rectangle, circle, or other shape), the key legend is positioned either within the key outline or adjacent the key outline. Each legend designates the function of its associated key. The controller 24 links the function of each touch screen switch to the key displayed beneath the respective one of the switches. As a result, pressing the touch screen 32 at a location above a displayed key sends a signal to the controller 24 to perform the function associated with the received signal. Hereinafter, references to pressing a "display key" denote that an operator is pressing the touch screen 32 at a location above the displayed key, while references to pressing a "fixed key" denote the operator is pressing a key on the mechanical keyboard 20. Moreover, a title of a particular display key appears in uppercase letters.

FIG. 3 is a block diagram illustration of the interaction between elements of the CSM 10. The system controller 24 receives signals from a mechanical keyboard 20 and the touch screen device 30. In response to the signal inputs received from the touch screen device 30 and the mechanical keyboard 20, the controller 24 performs a variety of functions. First, the controller 24 alters the output on the graphics display 16 to be viewed by the operator. Alternatively, the controller 24 instructs one of the peripheral devices to perform a function, or accepts information from a peripheral device.

As shown in FIG. 3, the peripheral devices include a bar code reader 41, a paper counter 42, a cash counter and scanner 43, a coin sorter 44, a printer 45, a personal computer 46, a coin dispenser 47, and a currency dispenser 48. The bar code reader 41 is useful in scanning various types of monetary media such as coupons or scanning a worker ID card. A Hewlett-Packard bar code wand model 8400 is an example of many bar code readers that could be utilized. The paper counter 42 is useful when counting a multitude of paper cash of the same denomination. JETCOUNT models 4050, 4051, 4070, and 4071 paper counters from Cummins-Allison, Corporation of Mt. Prospect, Illinois are examples which can be utilized. A JETSCAN model 4061 and 4062 cash scanner from Cummins-Allison, Corporation could be used as the cash counter and scanner 43 which is useful in counting and denominating large quantities of paper currency of multiple denominations.

Numerous JETSORT model series from Cummins-Allison, Corporation could be utilized as the coin sorter 44 which is useful when large amounts of coins are being recorded and reconciled.

Numerous common printers can be used. For example, the printer 45 could be a
5 Citizen printer model 562 or 3530 made by Citizen/CBM America Corp. of Santa Monica, California. Various types of personal computers 46 can be connected to the CSM 10, including computers linked directly into an accounting system. The Technitrol ACD-6 currency dispenser made by Technitrol Inc., Philadelphia, Pennsylvania, could be utilized in addition to the Diebold "Express Delivery" family of products from Diebold, Inc. of
10 Canton, Ohio. The currency dispenser 48 is useful when transactions are being recorded which result in the retransfer of money back to the person from whom money was received for recordation. It is also useful when foreign currency is being exchanged. The coin dispenser 47 could be a Telequip model "Transact" from Telequip Corp. of Hollis, New Hampshire, or other types of dispensers. Like the currency dispenser, this peripheral is
15 useful when money is retransferred. These peripheral devices are only examples of the types of peripheral devices which can be utilized. Other peripherals suitable to the needs of the specific operator could easily be incorporated into the overall system design as well.

Due to the touch screen device 30, the operator can access various modes of operation which the operator would be incapable of accessing in a basic cash settlement
20 device. The touch screen device 30 enhances the versatility of the basic cash settlement device by providing access to these modes in the basic operational mode without expanding the mechanical keyboard 20. Each mode includes various functions which provide the operator with numerous options which are accessed by merely depressing a displayed key on the touch screen 32. Preferably, the modes always accessible by the operator include a
25 help mode, a diagnostics mode, a directory mode, a reports mode, a screen format mode and a set-up mode. Each of these modes is described in detail below.

A resident memory is of the type known as a "flash memory" 51, which is capable of being rapidly erased and reprogrammed electrically. The electrical signals required to erase and reprogram the flash memory are provided by means of a flash card 50, which will
30 be described in greater detail hereinafter. As will be appreciated by those skilled in the art, the resident memory need not be comprised of a flash memory but may be comprised of any of several alternative types of memories known in the art, including electrically

erasable programmable read only memories (EEPROMs) or random access memories (RAMs). Nevertheless, flash memories are preferred because they are nonvolatile (e.g. their data content is preserved without requiring connection to a power supply), they may be electrically erased and reprogrammed within fractions of a second by simply sending
5 electrical control signals to the flash memory while it remains within the machine, and they are less expensive than EEPROMs. Preferably, the resident flash memory 51 will be electrically programmable in sectors so that portions of the memory can be erased and reprogrammed individually. An example of a specific type of flash memory which may be used in the cash settlement machine is product number Am29F010, commercially available
10 from Advanced Micro Devices, Inc. ("AMD") of Sunnyvale, CA and described in detail in AMD's publication entitled "Flash Memory Products -- 1996 Data Book/Handbook", incorporated herein by reference. However, those skilled in the art will appreciate that other types of flash memories may be utilized, depending on the system memory requirements and desired operating characteristics.

15 For added flexibility, according to one embodiment of the present invention, means for quickly and easily installing or removing the resident memory from the cash settlement machine may be provided. As can be appreciated by those skilled in the art, several devices may be utilized to accomplish this purpose. One solution is to house the resident memory chip in a zero insertion force ("ZIF") socket, in which movable contacts can be opened to
20 facilitate insertion or removal of the memory chip in the socket without damaging the lead pins of the memory chip. Typically, the movable contacts of the ZIF socket may be opened by simply depressing a lever or button on the surface of the socket. Although the embodiment described in relation to FIG. 3 utilizes a flash memory 51 as a resident memory, the resident memory of the cash settlement machine may be comprised of any of
25 several other types of memories known in the art. The ZIF-type socket described above may be used in combination with any of these alternate types of resident memories, and accordingly is not limited to use with a flash memory. Examples of ZIF-type sockets are disclosed in U.S. Pat. No. 5,342,213 ('213 patent), incorporated herein by reference and designated herein as FIGs. 4 and 5, respectively.

30 FIG. 4 shows an example of a conventional ZIF-type socket. As described in the '213 patent, the socket has holes 2 on the surface of a socket body 1. Lead pins of an IC device are inserted into the holes 2 as indicated with arrows A. After being inserted

through the holes 2, the lead pins encounter contacts positioned beneath the holes 2 for receiving the lead pins. Each of the contacts is made up of a first contact element 3 that is fixed and a second contact element 4 that is elastically deformable. Lead pins are inserted between the first and second contact elements 3 and 4, and then locked. An actuator 5 is installed to open or close the contacts. In the example shown in FIG. 4, the actuator 5 is formed with a movable plate arranged on the surface of the socket body 1, and has engaging means 6 that engage with the tops of the second contact elements 4. When lead pins are inserted, the actuator 5 is moved left. Then, the second contact elements 4 are moved left accordingly. Thereby, openings are created between the second contact elements 4 and the first contact elements 3. The lead pins are inserted smoothly without being subject to applied force by the contacts. When the lead pins are inserted into the contacts, the actuator 5 is moved right. Then, the second contact members are moved right and reset to the original positions. Eventually, the lead pins are held between the first and second contact elements 3 and 4.

FIG. 5 shows another example of a conventional ZIF-type socket. As described in the '213 patent, the socket has holes 2 on the surface of a socket body 1. Lead pins of an IC device are inserted into the holes 2 as indicated with arrows A. After being inserted through the holes 2, the lead pins encounter contacts positioned beneath the holes 2 for receiving the lead pins. Each of the contacts includes a first contact element 3 that is fixed and a second contact element 4 that is elastically deformable. The lead pins are inserted and held between the first and second contact elements 3 and 4. An actuator 5 is provided to open or close the contacts. In the example shown in FIG. 4, the actuator 5 is arranged inside the socket body 1 and includes an engaging means 6 for pressing the second contact elements 4 toward the first contact elements 3. The actuator 5 is pressed leftward by a cam 7. When lead pins are inserted, the actuator 5 lies at a position as illustrated. Openings are created between the second contact element 4 and the first contact elements 3. The lead pins are inserted smoothly without being subject to applied forces by the contacts. When the lead pins are inserted into the contacts, the cam 7 is rotated in the direction of arrow B to move the actuator 5 to the left. Then, the second contact elements 4 are moved toward the first contact elements 3. The lead pins are held between the first and second contact elements 3 and 4. In FIGs. 4 and 5, the first and second contact elements 3 and 4 are connected to a circuit board.

Referring now to FIG. 6, there is depicted a cash settlement machine 10 having an external slot 538 for receiving a flash card according to one embodiment of the invention. A removable flash card 540 is adapted to be inserted by a user through the external slot 538 and into a mating socket 542 located inside the machine adjacent the slot 538. Upon
5 insertion of the flash card 540 into the socket 542, an electrical connection is formed between the flash card 540 and the resident memory, which preferably is a flash memory 536. As will be appreciated by those skilled in the art, the flash card 540 may be electrically coupled to the resident memory by any of several alternative means other than a socket. The flash card 540 contains its own memory which is adapted to be pre-
10 programmed with updated software reflecting, for example, the most recent magnetic or optical characteristics of the currency denominations to be evaluated, the most recent operating code for the cash settlement machine 10, or an operating code associated with one of the modes of operation of the cash settlement machine 10 described in relation to FIG. 1a. Similar to the resident memory, the flash card memory need not be a flash
15 memory but may be comprised of any of several other types of memories known in the art, including electrically erasable programmable read only memories (EEPROMs) or one-time programmable read-only memories. Nevertheless, a flash memory is preferred because it offers a high degree of versatility at a relatively low cost.

The flash card 540 should be small and lightweight, sturdy enough to withstand
20 multiple uses, and adapted to be easily insertable into the slot 540 and corresponding socket 542 of the cash settlement machine 10 by users not having any special training. Further, the flash card 540 should not require any special electrostatic or physical protection to protect it from damage during shipping and handling. One type of flash card that has been found to satisfy these criteria is the FlashLite™ Memory Card available from AMP, Inc. of
25 Harrisburg, PA. However, it is envisioned that other suitable types of flash cards will become available from other manufacturers. The FlashLite™ card has a thickness of 3.3 mm (1/8 inch), a width of approximately 45 mm (1.8 inches) and a 68-pin connector interface compatible with the Personal Computer Memory Card International Association (PCMCIA) industry standards. Its length may be varied to suit the needs of the user. In
30 one embodiment, two sizes of flashcards (designated "half size" and "full size") have lengths of 2.1 inches (53 mm) and 3.3 inches (84 mm), respectively, but other sizes of flash cards may also be utilized.

Turning now to FIG. 7, there is depicted a circuit board assembly 541 including a socket 542 adapted to receive the flash card 540 according to one embodiment of the invention. Upon insertion of the flash card 540 into the socket 542, electrical signals are communicated from the flash card 540 to the resident memory of the machine. In one
5 embodiment, the socket 542 comprises a PCMCIA-compatible 68-position receptacle for receiving a flash card such as the FlashLite™ card described above. One type of socket that may be used for this purpose is AMP, Inc. product number 146773-1, which is adapted to extend vertically from the circuit board assembly 541 within the cash settlement machine
10 10. However, it will be appreciated by those skilled in the art that other types of sockets may be utilized, including those positioned horizontally in relation to the circuit board assembly 541, or those including a lever or button which may be depressed to eject the flash card 540 from the socket 542.

Upon insertion of the flash card 540 into its socket 542, the CPU 530 is capable of electrically detecting the presence of the card. If the FlashLite™ card is used, this is
15 accomplished by means of two specially designated connector pins CD₁ and CD₂ (assigned to pin numbers 536 and 567, respectively) being shorted to ground. The CPU 530 then compares the contents of the flash card memory with the contents of the resident flash memory 536. If the contents of the memories are the same, an audible or visual message is provided to the user indicating that the process is concluded. If the contents of the
20 memories are different, the required sectors in the resident flash memory 536 are erased and the new code is copied from the flash card 540 to the resident flash memory 536. Upon successful completion of the memory transfer, an audible or visual message is provided to the user indicating that the process is concluded. The flash card 540 can thereafter be removed from the cash settlement machine 10 and plugged into any other cash settlement
25 machine requiring a software update. In the event of an unsuccessful memory transfer, the machine will automatically re-attempt the transfer until, after multiple unsuccessful attempts, the user will be advised that there is a hard system failure and to call for service. Optionally, the flash card 540 may include a counter for limiting the number of times that a given flash card may be copied into the resident flash memory of additional machines. For
30 example, the flash card 540 may include a cycle count byte which is preset to a designated number and decrements upon each copy cycle.

Referring now to FIG. 8a, there is shown a block diagram of an alternate embodiment of a software loading system for a cash settlement machine. In this embodiment, the cash settlement machine 10 contains a resident memory 34 which is not a flash memory. In the embodiment shown, the resident memory is an EPROM, but it may
5 be comprised of alternate types of non-flash memories. The cash settlement machine 10 is provided with a socket 42 adapted to receive a flash card 40 therein substantially as described above. Upon insertion of a flash card 40 into the socket 42, the CPU 30 electrically detects the presence of the card as described in relation to FIG. 7, and thereafter executes the code directly from the flash card memory as long as the flash card 40 remains
10 inserted in the socket 42. If the flash card 40 were to be removed from the socket 42, the CPU 30 would revert to executing the old code from the resident memory 34. In this embodiment, because the flash card 40 must remain inserted in the socket 42 in order to execute the updated code, each cash settlement machine 10 must be equipped with its own dedicated flash card 40.

15 The flash card may also be used in a reverse manner, to "clone" a particular machine by copying the resident memory of the machine onto a flash card and subsequently using the flash card to introduce the identical code into other machines. Referring now to FIG. 8b, at step 602, the user inserts a flash card into the machine. At step 604, the CPU checks to see if the flash card was inserted. If the answer to step 604 is affirmative, then at
20 step 606, the CPU determines whether cloning has been enabled. If the answer to step 604 is negative, then control returns to 602 where the user again is asked to insert the flash card. At step 608, the CPU loads the contents of the resident memory onto the flash card. Next, at step 610, the CPU performs a test to determine whether the flash cards contents match the resident memory's contents. If the answer to step 610 is affirmative, execution
25 continues at step 612. If the answer at step 610 is negative, then execution continues at step 614 where a variable which stores the number of copying attempts is incremented. At step 616, this variable is compared to determine whether it is less than a preset limit. If the answer to step 616 is affirmative, then control continues at step 608. If the answer at step 616 is negative, indicating the limit has been reached for the number of re-try attempts,
30 then control continues with step 618 where a message is displayed to the user indicating that the contents of the memory have not been copied.

Conversely, at step 612, the CPU informs the user that the copy is complete and successful by flashing a message on the screen. The flash card then could be inserted into other cash settlement machines.

Due to the touch screen device 30, the operator can access various modes of operation which the operator would be incapable of accessing in a basic cash settlement device. The touch screen device 30 enhances the versatility of the basic cash settlement device by providing access to these modes in the basic operational mode without expanding the mechanical keyboard 20. Each mode includes various functions which provide the operator with numerous options which are accessed by merely depressing a displayed key on the touch screen 32. Preferably, the modes always accessible by the operator include a help mode, a diagnostics mode, a directory mode, a reports mode, a screen format mode and a set-up mode. Each of these modes is described in detail below.

FIG. 9 illustrates the display 16 in normal operation. On the bottom portion of the display 16, six modes are shown as mode display keys which can be accessed by pressing the touch screen 32 superimposed over the graphics display 16. When one of these mode display keys is actuated, the graphics display 16 changes into a menu screen associated with that mode. Alternatively, the graphics display 16 can simply have only one mode display key which when actuated by the operator causes the graphics display 16 to display all available modes. This alternative would preserve the space available on the graphics display 16 in the basic operating mode.

A HELP display key 50 allows the operator to access a help mode when the operator is uncertain as to the meaning or function of a fixed key 18 on the mechanical keyboard 20. The help mode not only describes the function of the fixed key 18, but also includes examples utilizing the fixed key 18 of which the operator is uncertain to further teach the operator. Additionally, the help mode includes an editing session which permits customization of the help mode information. A DIAGNOSTICS display key 52 allows the operator to access a diagnostics mode which checks the status of the touch screen 32 and the communication links to the peripheral devices via the ports 29. A DIRECTORY display key 54 allows the operator to access a directory mode wherein the operator can search the headers of all memory registers. This search can be accomplished by using operator-entered words or numerals. A REPORTS display key 56 allows the operator to enter a reports mode. The operator selects reports which are to be sent to a printer

peripheral device or downloaded to a personal computer. The reports mode also allows the operator to select the format of the report. A SCREEN FORMAT display key 58 allows the operator to access a screen format mode which is used to vary the manner in which characters and data are displayed on the graphics display 16. Finally, a SET-UP display key 5 60 allows the operator to access a set-up mode. The operator utilizes the set-up mode to configure the database registers, determine the ports 29 to which the peripheral devices communicate, label fixed keys 18 from the variable function group 35 on the mechanical keyboard 20, and enable or disable fixed key 18 or display keys. Each of these modes is described in detail in the following paragraphs.

10 In response to actuating the HELP display key 50 on FIG. 9 (step 70), the flow diagram logic of FIGs. 10a and 10b is then followed. The display 16 then changes to the help mode prompting the operator to select an option using displayed keys (step 72). The operator may simply decide to return to the operating mode (step 74) by selecting the EXIT HELP MODE display key. Alternatively, the operator may decide to receive help (step 76) 15 or to edit the help file (step 78) by selecting the RECEIVE HELP or EDIT HELP FILE display keys respectively.

If the operator chooses to receive help (step 76), the graphics display 16 then prompts the operator to select a fixed key 18 from the mechanical keyboard 20 on which the operator requires assistance or to exit the help mode (step 80). The operator may again 20 select the EXIT HELP MODE display key (step 82) and return to the screen in the basic operating mode the operator was previously viewing. However, if the operator selects a fixed key 18 from the mechanical keyboard 20 (step 84), then the graphics display 16 describes the depressed fixed key and indicates how it is used in operating the CSM 10 (step 86). Additionally, the display 16 asks the operator if an example is needed. If the 25 operator selects in the negative to the prompting for an example (step 88), then the display 16 returns to step 80 to allow the operator to receive assistance on additional fixed keys 18.

If the operator chooses to receive an example (step 90), then the display 16 gives an example which uses the fixed key 18 (step 92). If the example is lengthy and requires more than one screen, the operator can hit a NEXT PAGE or a PREVIOUS PAGE display key to 30 view the entire text of the example. Finally, when the example has been completed, the operator depresses a FINISHED EXAMPLE display key (step 94) which returns the display

16 to step 80 which allows the operator to receive assistance on additional fixed keys 18 or exit the help mode (step 82).

Instead of opting to receive help (step 76), the operator can choose to edit the help file. After actuating the EDIT HELP FILE display key (step 78), the display 16 would
5 prompt the operator to select a fixed key 18 from the mechanical keyboard 20 which needs its help information edited (step 96). At this point, the operator can simply select the EXIT HELP MODE display key (step 98) and return to the screen of the basic operating mode which was previously being viewed, or depress a fixed key 18 from the mechanical
10 keyboard 20 (step 102). If the operator chooses step 102, then the display 16 asks the operator whether editing of the description of the depressed fixed key or the example associated with the depressed fixed key is required (step 104). The operator then chooses whether the description requires editing or the example requires editing.

If the operator chooses the EDIT DESCRIPTION display key (step 106), then a screen similar to FIG. 11 is shown on the display 16 (step 110). The operator moves the
15 cursor across the text to the point where editing is desired via the CURSOR ARROW display keys (step 112). The operator can then choose to delete the text by using a BACKSPACE display key at the location of the cursor (step 112). Alternatively, the operator can write over existing text with the TYPEOVER display key at the location of the cursor (step 112). Lastly, the operator can insert words with the INSERT display key at the
20 location of the cursor (step 112). When the operator chooses to the INSERT or TYPEOVER display keys, the screen switches to a lower case alpha character screen as shown in FIG. 12a (step 114). The operator then uses the displayed alpha keys to enter words into the description illustrated at the top of the screen. If the operator desires upper case letters, then the operator simply depresses the SHIFT display key and the letters
25 become upper case as illustrated in FIG. 12b. Alternatively, the operator can select the SYMBOL display key and a screen appears with symbols as shown in FIG. 12c. The operator can then return to the alpha character screens in FIGS. 12a and 12b by depressing the ALPHA display key shown in FIG. 12c. Also, the operator utilizes the numerical group 36 on the mechanical keyboard 20 for entering any numbers, if numbers are needed. Once
30 editing using the display keys is complete, the operator selects the RETURN display key (step 116) and returns to the previous screen in FIG. 11 (step 112). Again, the operator can move the cursor to a location in the newly-edited description where additional editing is

needed. Lastly, the operator selects the FINISHED EDIT display key (step 118) to return to step 96 which allows the operator to continue editing, or exit the help mode as shown in step 98 by pressing the EXIT HELP display key.

The operator can likewise edit the example for a given fixed key 18 by selecting the
5 EDIT EXAMPLE display key (step 108). The graphics display 16 shows the example for the depressed fixed key 18 and allows the operator to edit the example (step 120) as also depicted by FIG. 11. Again, the operator uses the ARROW display keys to move the cursor to the position which requires editing (step 122). Then, the operator selects the INSERT, TYPEOVER, or BACKSPACE display keys to edit the text of the example (step 122).
10 Depressing the INSERT or TYPEOVER display keys causes FIG. 12a to appear on the screen (step 124) wherein the operator can further access the upper case letters in FIG. 12b or the symbols in FIG. 12c by depressing the SHIFT display key or SYMBOL display key respectively. Once editing is complete, the operator selects the RETURN display key (step 126) and returns to the previous screen in FIG. 11 (step 122). Again, the operator moves
15 the cursor to a location where additional editing is needed or selects the FINISHED EDIT display key (step 128) and returns to step 96 wherein the help mode can be exited as shown in step 98. In addition to ALPHA and SYMBOL display keys, the display keys can also include numeral display keys as well although they are not shown in FIGS. 12a-12c.

The help mode can also be utilized to teach the operator basic information
20 concerning operation and maintenance of the touch screen device 30. Likewise, it can be used to describe functions associated with the display keys of the touch screen 32.

Referring now to FIGS. 13a and 13b, the flow diagram for the directory mode is illustrated. The directory mode allows the operator to quickly search all registers in the memory device 51 of FIG. 3 for desired alpha characters or numerical sequences. This is
25 useful in that the operator may want to pull up all registers relating to a specific type of transaction or by a specific operator. Because the operator may not know the location of all registers containing the desired transactions, the operator enters alpha characters or a numerical sequence which is common throughout all of the desired transactions. The search may be useful for searching for a specific employee number, employee name, or
30 account number. The controller 24 then searches the memory device 51 for all registers having a header identification corresponding to the operator-entered alpha characters or numerical sequence and displays these registers and their corresponding header

identification on the display 16. However, the data within each register is not displayed.

The operator then scrolls through the displayed registers containing the desired alpha characters or numerical sequence and selects a register whereby the data within that

selected register is then displayed. Considering the numerous registers in the memory

5 device 51, it would be quite difficult for an operator to recall which data is in which register and, therefore, this mode can be quite advantageous.

The operator working in the basic operating mode actuates the touch screen at a position above the DIRECTORY display key 54 (step 130) to enter the directory mode.

The display 16 then asks the operator to select the method in which he or she would prefer

10 to search, whether it be a search by words or by numerical sequence (step 132).

Additionally, the operator may choose to exit the directory mode by selecting the EXIT DIRECTORY display key (step 134).

If the operator selects the SEARCH BY NUMBERS display key (step 136), then the display 16 prompts the user to enter a numerical sequence on which the controller 24

15 bases the search of the registers of the memory device 50 (step 138). Alternatively, the

operator can select the EXIT SEARCH display key (step 140) and return to the main

directory mode screen (step 132). The operator enters the desired numerical sequence via

the numerical group 36 of FIG. 2a on the mechanical keyboard 20 (step 142). The

controller 24 then searches all registers for the numerical sequence entered (step 144) and

20 displays the first ten registers with their associated header lines containing the numerical

sequence on the display 16 as in FIG. 14 (step 146). The numerical sequence "241" is used

in FIGS. 13a, 13b and 14 as an example. The operator then chooses to view the next or

previous ten registers having the desired numerical sequence by depressing the NEXT 10

REGISTERS display key or PREVIOUS 10 REGISTERS display key, respectively (step

25 148). Additionally, the operator can depress the CURSOR ARROW display keys to move

the cursor to a particular register on the display 16 (step 148). After moving the cursor, the

operator can select the VIEW REGISTER display key (step 148) to view the entire header

and all data contained in the register on which the cursor is positioned as shown in FIG. 15 (step 150). The operator can then return to the listing of the registers with the desired

30 numerical sequence by selecting the RETURN TO REGISTER LIST display key (step 152)

which returns the operator to the screen illustrated in FIG. 10 (step 146). Alternatively, the

operator can select the NEW SEARCH OR END SEARCH display key (step 154) and return to step 138.

- If the operator selects the SEARCH BY WORD(S) display key (step 156), then the display 16 appears as in FIG. 16 and requires the user to enter a word or words on which
- 5 the controller 24 bases the search of the registers of the memory device 50 (step 158). Alternatively, the operator can select the EXIT SEARCH display key (step 160) and return to the main directory mode screen (step 132). The operator enters the desired word via the ALPHA display keys on the touch screen (step 162) and the word is printed across the top of the screen as shown in FIG. 16. The controller 24 then searches all registers for the word
- 10 entered (step 164) and displays the first ten registers with their associated header line containing the word on the display 16 as in FIG. 17 (step 166). The word "teller" is used in FIGS. 13a, 13b, 16 and 17 as an example. The operator then chooses to view the next or previous ten registers having the desired word by depressing the NEXT 10 REGISTERS display key or PREVIOUS 10 REGISTERS display key, respectively (step 168).
- 15 Additionally, the operator can depress the CURSOR ARROW display keys to move the cursor to a particular register on the display 16 (step 168). After moving the cursor, the operator selects the VIEW ENTIRE REGISTER display key (step 168) to view the entire header and all data contained in the register on which the cursor is positioned on the display 16 (step 170) in a manner similar to that shown in FIG. 15. The operator then returns to the
- 20 list of registers having the desired word by selecting the RETURN TO REGISTER LIST display key (step 172) which returns the operator to the screen shown in FIG. 17 (step 166). Alternatively, the operator selects the NEW SEARCH OR END SEARCH display key (step 174) and returns to step 138.

- Referring now to FIGS. 18a and 18b, the operator, upon selecting the
- 25 DIAGNOSTICS display key 52 from the basic operating mode, enters the diagnostics mode (step 190). The diagnostics mode allows the operator to verify the operability of the touch screen device 30 and the ports 29 (step 192). Once in the diagnostics mode, the operator exits the diagnostics mode by selecting the EXIT DIAGNOSTICS MODE display key (step 194).

- 30 If the operator chooses to test the ports by selecting the VERIFY COMMUNICATION WITH PORTS display key (step 196), then the display 16 shows the current status of the ports 29 and the peripheral devices to which they are coupled as shown

in FIG. 19 (step 198). After viewing the status, the operator may choose to exit the diagnostics mode by selecting the EXIT DIAGNOSTICS MODE display key (step 200). Alternatively, the communication status of the ports can be verified by selecting the TEST PORT display key (step 202) which causes the display 16 to prompt the operator for the
5 ports 29 which need to be tested (step 204). The operator then selects one of the ports 29 (step 206). The display 16 then instructs the operator to connect a communication test connector between the selected port 29 and a computer-selected adjacent port (step 208). The operator connects the communications test connector between these ports and selects a BEGIN TEST display key (step 210). The controller 24 then performs the test (step 212)
10 and displays the results of the communications test on the display 16 as either "acceptable" or "in error" (step 214). The operator then can select the TEST NEW PORT display key (step 216) and return to step 204. Alternatively, the operator can select the EXIT DIAGNOSTICS MODE display key (step 218) and return to the screen in the basic operating mode which the operator was viewing prior to entering the diagnostics mode.

15 Alternatively, a more simplistic test can be employed wherein the operator uses a series of test connectors. Each connector is placed between two adjacent ports. The test is run and the operator is informed whether each port has properly responded to the test.

If the operator chooses to test the touch screen device 30 (step 220), the display 16 prompts the operator to select any portion of the touch screen 32 (step 222). The operator
20 then actuates the touch screen 32 at any location (step 224). Upon actuation, the display 16 then shows the display keys capable for that specific touch screen 32 and graphics display 16, and darkens the display key which the controller 24 believes the operator is actuating (step 226). Once the operator stops actuating the touch screen 32, the display 16 returns to the screen described in step 222. The operator then tests another display key, or selects the
25 EXIT DIAGNOSTICS MODE display key and returns to the basic operating mode (step 228).

Referring now to FIGS. 20a and 20b, the operator has the ability to modify the manner in which graphics are displayed on the graphics display 16 in the basic operating mode. In the basic operating mode, the operator depresses the SCREEN FORMAT display
30 key 56 (step 250) and the graphics display 16 prompts the operator whether the screen format is to be changed manually or by copying from another register (step 252). The

operator can also exit the screen format mode by selecting the EXIT SCREEN FORMAT MODE display key (step 253).

If the operator selects the COPY FROM ANOTHER REGISTER display key (step 254), the display 16 prompts the operator for the ID of the register from which the format is to be copied (step 256). The operator may desire to return to the basic operating mode and select the EXIT SCREEN FORMAT mode display key (step 257). To copy a format, the operator enters the ID of the register in the memory device 50 which has the desirable format (step 258). The controller 24 copies the screen format from that particular register (step 260) and automatically returns to the basic operating mode which now illustrates the data on the graphics display 16 with the newly copied format. This method of modifying the format allows the operator to display numerous registers in a common format without manual modification of each register.

If the operator chooses the MANUALLY MODIFY FORMAT display key (step 262), the display 16 shows the screen from the basic operating mode from which the operator entered the screen format mode as shown in FIG. 21 (step 264). If the operator selects the FONT SIZE ALL GROUPS (step 266), then the machine displays a list of font sizes available (step 268). The operator selects the display key with the desired font size (step 270) and the controller 24 changes the font of all characters on the screen (step 272) and returns to step 264 for additional editing or to exit the mode by selecting the EXIT SCREEN FORMAT MODE display button (step 274). The operator can move the cursor around the screen by the CURSOR ARROW display keys (step 276). The operator can select a group, whether the group is a data title such as "coins" or "cash", or numerical data by selecting the SELECT/FINISH SELECT GROUP display key which toggles between selecting a group and finishing the selection of the group. The selected group then appears in inverse color (dark on light) and the controller 24 locks onto the group (step 278). The operator uses the MOVE GROUP ARROWS to move the highlighted group across the display 16 to a new position (step 280). Upon locating the desirable new position, the operator again selects the SELECT/FINISH SELECT GROUP display key (step 282) and the controller 24 records the new group position and returns to step 264 (step 284).

Alternatively, the operator may select the FONT SIZE GROUP display key to change the font size of only the highlighted group (step 286). Again, the display 16 gives the operator alternative font sizes (step 288) from which the operator chooses a new font

size (step 290). The machine then changes the font size of the selected group (step 292) and the operator chooses the SELECT/FINISH SELECT GROUP display key (step 294) wherein the machine records the new font size of the group (step 296) and returns to step 264 for more editing. Additionally, different fonts could be used in addition to different
5 font sizes for more versatility. This feature would depend on the ability of the graphics display 16 to display alternative type of fonts. Additionally, the screen format mode may allow the operator to modify the color of the graphics display 16, as well as the characters and display keys, if the graphics display 16 has color capability. This is accomplished in a algorithm similar to the font changing algorithm.

10 Referring now to FIGS. 22a and 22b, the flow diagram for the reports mode is illustrated. After selecting the REPORTS display key in the main menu from the basic operating mode (step 310), the operator may print a report of particular registers or the basic operating mode screen from which the operator just exited (step 312). Additionally, the display 16 allows the operator to browse through the variety of default print formats in
15 the memory device 50 or modify a default format. Lastly, the operator can exit this mode by selecting the EXIT REPORTS MODE display key (step 314).

If the operator chooses to print the current operating mode screen from which the operator has exited, then the operator selects the PRINT CURRENT OPERATING MODE SCREEN display key (step 316). In step 318, the display 16 then shows the operating
20 mode screen as it would be printed and prompts the operator to print the report, change the report format, or return to the main reports menu by depressing the RETURN TO MAIN REPORTS MENU display key (step 320).

If the operator selects to print the report by selecting the PRINT display key (322), then the controller 24 sends data to the printer peripheral device for printing (step 324) and
25 the screen returns to the main reports screen in step 312. If the operator selects the CHANGE FORMAT display key (step 326), then the display 16 lists all available formats as display keys from which the operator can select a new format for the screen to be printed (step 328). The operator can then select a new format (step 330) and the controller 24 incorporates screen data into the new format (step 332). The operator then returns to step
30 318 wherein the new format is displayed and can be printed.

If the operator chooses to view or modify the formats by selecting the VIEW OR MODIFY FORMATS display key (step 334), then the display 16 would show a list of all

formats as display keys (step 336). The operator then selects a format to be viewed or modified (step 338). The display 16 then shows the parameters which that particular format would print and the location on the page of where it would be printed as shown in FIG. 23 (step 340). The line numbers on the page are shown on the far left while the character location horizontally across the page is shown at the top. The operator can then edit the format by using the display keys (step 342). The operator can move up and down the page by use of the SCROLL UP/DOWN display keys. The operator can add a line or remove a line between vertically adjacent characters by use of the ADD LINE and REMOVE LINE display keys. The operator can add or remove spaces between horizontally adjacent characters by the ADD SPACE and REMOVE SPACE display keys. Most importantly, every title (e.g. "cash") and parameter (e.g. D1-D4) can be printed or deleted from the printed page by actuating the touch screen 32 over the title or parameter. If the box surrounding the title or parameter is non-shaded, the title or parameter will be printed. If the box is shaded, the parameter or title will not be printed in the report. For example, parameters "T4", "D4", "N4", "T5", "CT3", "CD3", and "CN3" which correspond to entries in a register of the memory device 50 will not be printed in the print report of FIG. 23. Nor will the title of "Total Cash" be printed either. The operator uses the SCROLL DOWN display key to see the remaining parameters and title that will be printed. After any editing, the controller 24 automatically records the edit (step 344). The operator returns to step 340 and can continue to further edit, or return to the main reports menu of step 312 by actuating the EXIT FORMATS display key (step 346). Alternatively, this type of report format initialization could exist under a set-up mode instead of under the reports mode.

If the operator chooses to print selected registers from the main reports menu (step 312) by selecting the PRINT SELECTED REGISTERS display key (step 348), then the display 16 asks the operator to enter the register IDs to be printed (step 350). The operator can select a range of register IDs by the numerical keypad group on the mechanical keyboard and by using the (-) THROUGH and (&) AND display keys (step 352). These display keys tell the CSM whether the reports of two adjacent ID registers should be made (i.e. 942 & 960) or reports of all registers between the selected ID registers should be made (i.e. 942-960). The display 16 then lists the selected registers and the formats for the print reports (step 354). The operator can choose to return to the main menu by selecting the

RETURN TO MAIN REPORTS MENU display key (step 356). The operator can also select the PRINT display key (step 358) wherein the controller 24 sends the data to the printer (step 360) and the display 16 returns to the main reports menu at step 312.

Alternatively, the operator can select the CHANGE FORMAT display key (step 362)

- 5 wherein the display 16 shows all formats from which the operator may choose (step 364). The operator selects a new format (step 366) into which the controller 24 incorporates the data to be printed (step 368) and returns the operator to step 354 for printing with the new format.

- The reports mode may include additional types of basic operational reports which the operator would select through the display keys in the report mode. A session report is a summary of the transactions encountered during that particular operator session. A daily report summarizes all sessions occurring within a particular day. A productivity report records the time required for the operator to reconcile transactions and determines the operator efficiency on the CSM 10. A register report allows the operator to print out all data base registers which the operator has initialized and labeled with a header and database ID number. A report of subtotals, totals, and grandtotals which are stored in pre-determined registers can be obtained. A cash-in and cash-out report summarizing the net result of transactions wherein money is also dispensed can be acquired. All of these reports can be displayed as a list of display keys once the operator enters the report mode, although they have not been included in the flow diagram of FIGS. 22a and 22b.

Additionally, the reports could be formatted to send to a personal computer connected to one of the ports 29. Thus, large amounts of report information can be sent to database of a personal computer and processed for accounting purposes. The data could be formatted in ASCII or other related formats and transmitted via an established protocol.

- 25 Referring now to FIGS. 24a and 24b, the operator has the ability to enter a set-up mode which allows for the initialization and labeling of functions, registers, and ports. Upon actuating the SET-UP display key 60 in the basic operating mode (step 379), the display 16 prompts the operator to enter the set-up option which the operator desires (step 380). To exit the set-up mode, the operator selects the EXIT SET-UP MODE display key (step 381).

30 If the operator chooses the ENABLE/DISABLE FUNCTION display key (step 382), the display 16 prompts the operator to enter a fixed key 18 from the mechanical

keyboard 20 which the operator desires to be disabled or enabled (step 384). The operator then selects the fixed key 18 from the mechanical keyboard 20 (step 386), and the display 16 shows the fixed key selected, displays the current status of the fixed key 18, and asks the operator whether to maintain the current status or change the status (step 388). The

5 operator then selects an ENABLE or DISABLE display key to change the status of that fixed key 18 (step 389). When the operator is finished, the operator selects a FINISHED display key (step 390) and returns to step 380. The enable and disable function can also be configured to disable or enable the display keys on the touch screen 32 in a manner similar to that described above for the fixed keys 18.

10 The operator can also select a PORT SET-UP display key from the main set-up menu (step 392) and the display 16 prompts the operator to enter the port number of the ports 29 to be initialized (step 394). The operator then selects the port number from the PORT NUMBER display keys on the touch screen 32 (step 396). The display 16 then shows the status of the port selected with those parameters of the port highlighted with a
15 shaded display key as depicted in FIG. 25 (step 398). The operator can then select different parameters relating to the port function, baud rate, data, and parity (step 400) by selecting other display keys which are then automatically recorded by the controller 24 (step 402). The operator then uses the NEXT and PREVIOUS display keys to scroll through the various ports and review their current status, and make changes if necessary. When
20 finished, the operator then chooses the EXIT display key and returns to the main menu of the set-up mode (step 406).

The operator can also label the header of keys from the variable function key group 35 on the mechanical keyboard 20. Upon selecting the LABEL FUNCTION KEY
HEADER display key (step 408), the operator is prompted to select a variable function key
25 35 from the mechanical keyboard 20 (step 410). The operator selects a key, such as "F3" (step 412), and the graphics display 16 shows alpha characters similar to those shown in FIGS. 12a-12c except the line at the top of the screen reads "Enter Header for F3:" (step 414). The operator then selects the characters for the F3 key header (step 416). The operator selects the RETURN display key after labeling is complete (step 418) and returns
30 to the main menu of the set-up mode in step 380. Although not depicted in the set-up mode flow diagram, the operator could also use the set-up mode to label display keys on the

graphics display 16. Thus, customization of the touch screen device 30 can be readily obtained.

The operator can also configure the database for the registers of the memory device 50. Upon selecting the DATABASE CONFIGURATION display key (step 420), the
5 operator is prompted to select a database ID label (step 422). The controller 24 then searches the memory device 50 for an available register which will now be labeled with the database ID. The operator selects an ID label, such as "123" (step 424), and the graphics display 16 shows alpha characters similar to those shown in FIGS. 12a-12c except the line at the top of the screen reads "Enter Header for ID# 123" (step 426). The operator then
10 selects the characters for the ID header (step 428). Lastly, the operator selects the RETURN display key when complete (step 430) and returns to the main set-up menu in step 380.

Although only a function related to the labeling of the registers is shown, numerous other functions could be accomplished by use of the touch screen 32 after selecting the
15 DATABASE CONFIGURATION display key. For example, the operator can establish the number of lines of the database ID label that should be displayed in the basic operational mode. An internal clock of the CSM 10 can be set or changed. A till fund value which establishes the initial balance of a particular register can be input such that it is offset against a declared balance when the transaction associated with that register are later
20 recorded for reconciliation. Numerous additional functions could also be accomplished.

The set-up mode can be used to provide basic information to the CSM 10 concerning data to be input through peripheral devices via the ports 29. For example, the manner in which data is to be input, either manually or automatically through peripheral devices, can be established. And more detailed information on the automated data entry
25 can be programmed. For example, the number of paper bills which the paper counter 42 will count in one counting increment can be input into the CSM 10 so that the CSM 10 understands the value of the data transmitted from the paper counter 42. Numerous other initializations related to the peripheral devices can also be accomplished easily through the use of the touch screen device 30.

30 The modes which have been described in detail have included various functions within them. It would be simple to combine all of these functions into fewer "modes." Alternatively, it would be simple to expand the number of modes by giving each function

herein described its own "mode." This fact is the essence of the touch screen device 30 in that it provides substantial flexibility.

In another embodiment, the CSM 10 uses only the touch screen 32 for the operator interface panel. The mechanical keyboard 20 is completely removed and all mechanical
5 keys are now displayed as display keys on the graphics display 16. As with the mechanical keyboard 20, the display keys which are most commonly used are ergonomically grouped together on the graphics display 16. These grouped keys are arranged about the edges of the graphics display such that the middle of the display 16 can be devoted to display of the financial data, as shown in FIG. 26. Any labeling of the variable function keys (F1-F6) can
10 now be shown on the display keys and whether the display key is disabled. Also, the monetary group keys can be highlighted by shading the value of the monetary data that is to be entered by the operator, which in FIG. 26, is dollars. The display 16 also includes a FOREIGN CURRENCY display key which allows the operator to choose a variety of foreign currencies which will be recorded and reconciled. After selecting the appropriate
15 currency, the monetary group display keys change to denominations and symbols associated with the selected foreign currency and the CSM 10 recognizes any inputs to be in the newly selected foreign currency. To return to the basic U.S. currency, the operator again selects the FOREIGN CURRENCY display key and selects a U.S. currency display key. Additionally, the selection of the foreign currency after actuating the FOREIGN
20 CURRENCY display key could be through the operator touching the touch screen on a country of a world map displayed on the graphics display 16 which is then highlighted. Also, the exchange rate and other financial parameters could be input through the attached peripheral devices.

In conjunction with the touch screen device 30, the controller 24 can create
25 numerous patterns of the display keys on the display 16. The touch screen device 30 and controller 24 permit a virtually unlimited number of display keys to be shown on the display 16. The number of display keys is constrained primarily by the capacity of the memory device 51 in the controller 24 and the touch screen 32 output signal resolution. Selection of the display pattern could be achieved within the set-up mode. Such a large
30 number of keys would occupy an inordinate amount of space if formed as part of a mechanical keyboard.

In yet another alternative embodiment, the controller 24 and touch screen device 30 are used to customize data entry fields, edit key legends, display key legends and other textual information in different languages, disable or enable display keys shown on the display 16, and reposition selected display keys displayed on the display 16. In addition, 5 the controller 24 and touch screen device 30 may be employed to modify the complexity of the display patterns on the display 16 to match the level of experience of the operator. For example, a novice may prefer a large number of relatively simple display patterns while a more experienced operator may prefer a small number of relatively complex display patterns.

10 While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

While the present invention has been described with reference to one or more particular embodiments, those skilled in the art will recognize that many changes may be made thereto without departing from the spirit and scope of the present invention. Each of these embodiments and obvious variations thereof is contemplated as falling within the spirit and scope of the claimed invention, which is set forth in the following claims.

CLAIMS:

1. A software loading system for a cash settlement station for recording and reconciling financial data, said software loading system comprising:
 - a resident memory containing an initial software code to be executed by the
5 controller; and
 - a flash card having a flash card memory containing a second software code, said flash card being adapted to be removably electrically coupled to the cash settlement machine, said resident memory being adapted to erase the initial software code and store the second software code in response to the flash card being electrically coupled to the cash
10 settlement machine, said resident memory being adapted to retain the second software code in response to the flash card being thereafter removed from the cash settlement machine.
2. The software loading system of claim 1 wherein said resident memory comprises a flash memory.
3. The software loading system of claim 1 wherein said flash card memory
15 comprises a flash memory.
4. The software loading system of claim 1 wherein said resident memory is housed within a ZIF socket.
5. The software loading system of claim 1 wherein said flash card is adapted to be electrically coupled and removed from a plurality of additional machines to accomplish a
20 number of additional software changes, said flash card memory including a counter for limiting the number of additional software changes said flash card may accomplish.
6. The software loading system of claim 5 wherein said resident memory comprises a flash memory.
7. The software loading system of claim 5 wherein said flash card memory
25 comprises a flash memory.
8. The software loading system of claim 5 wherein said resident memory is housed within a ZIF socket.
9. A method of loading software changes into a cash settlement machine having a controller, said cash settlement machine having a resident memory containing an initial
30 software code to be executed by said controller, said method of loading software upgrades comprising the steps of:

storing a second software code in a flash card memory contained within a flash card remote from said cash settlement machine;

electrically coupling said flash card to the cash settlement machine to cause said resident memory to erase the initial software code and store the second software code; and

5 removing said flash card from the cash settlement machine, said resident memory of said cash settlement machine thereafter retaining the second software code.

10. The method of loading software changes of claim 9 wherein the steps of electrically coupling and removing said flash card are repeated on a plurality of additional cash settlement machines to accomplish a number of additional software changes.

10 11. The method of loading software changes of claim 10 further comprising the step of limiting the number of additional software changes that may be accomplished by said flash card.

12. A software loading system for a cash settlement machine having a controller for recording and reconciling financial data, said software loading system comprising:

15 a resident memory containing an initial software code to be executed by the controller; and

a flash card having a flash card memory containing a second software code, said flash card being adapted to be removably electrically coupled to the cash settlement machine, said controller being adapted to execute said second software code in response to
20 the flash card being electrically coupled to the cash settlement machine, said controller being adapted to execute said initial software code in response to the flash card being thereafter removed from the cash settlement machine.

13. The software loading system of claim 12 wherein said flash card memory comprises a flash memory.

25 14. The software loading system of claim 12 wherein said resident memory is housed within a ZIF socket.

15. The software loading system of claim 14 wherein said flash card memory comprises a flash memory.

30 16. A method of loading software changes in a cash settlement machine having a controller for evaluating a stack of currency bills, said cash settlement machine having a resident memory containing an initial software code to be executed by said controller, said

method of loading software changes into the cash settlement machine comprising the steps of:

storing a second software code in a flash card memory contained within a flash card remote from said cash settlement machine; and

5 electrically coupling said flash card into the cash settlement machine to cause said controller to execute said second software code.

17. A cash settlement machine for recording and reconciling financial data, comprising:

10 a graphics display for displaying information to be viewed by an operator of said cash settlement machine, said information including portions of said financial data;

operator interface panels including a mechanical keyboard having fixed keys and a touch screen mounted over said graphics display for providing input signals in response to manual actuation of said fixed keys and said touch screen, said input signals including a plurality of mode-entry signals for commanding said cash settlement machine to operate in
15 a plurality of operational modes, each of said plurality of mode-entry signals corresponding to a respective one of said plurality of operational modes;

a flash memory for storing instructions for each of said plurality of operational modes;

20 a controller coupled to said operator interface panels to said graphics display, said controller for manipulating said data, said controller including

a graphics generator for generating said information on said graphics display, said information further including display keys, each of said display keys positioned on said graphics display at a key display location, each of said input signals from said touch screen corresponding to manual actuation of said touch
25 screen above a respective one of said key display locations, and

means for executing said instructions, said executing means executing instructions for one of said operational modes upon receipt of said corresponding mode-entry signal, said instructions including display key instructions wherein said executing means instructs said graphics generator to generate said display keys at said display key
30 locations.

18. The cash settlement machine of claim 17, further including ports electronically communicating with said controller, and wherein peripheral devices are electronically connected to said ports.

19. The cash settlement machine of claim 17, wherein said input signals include
5 a plurality of function signals commanding said cash settlement machine to perform a plurality of functions for processing said data, each of said function signals corresponding to a respective one of said plurality of functions, and wherein said instructions include function instructions, said executing means executing said function instructions to perform said functions upon receipt of said corresponding function signal.

10 20. The cash settlement machine of claim 17, wherein one of said plurality of operational modes includes a basic operational mode for recording and reconciling said financial data, and wherein said generating means generating display keys corresponding to other ones of said plurality of operational modes on said graphics display.

21. The cash settlement machine of claim 17, wherein one of said plurality of
15 operational modes includes a help mode for displaying operational information concerning said cash settlement machine on said graphics display, said display keys include a help mode key and said mode-entry signals include a help mode-entry signal corresponding to said help mode key, said executing means executing said instructions corresponding to said help mode upon receipt of said help mode-entry signal, said display key instructions
20 instructing said graphics generator to generate a set of help mode display keys upon receipt of said help mode-entry signal.

22. The cash settlement machine of claim 21, wherein said set of help mode display keys includes help information display keys for displaying information on said fixed keys of said mechanical keyboard and help example display keys for displaying
25 examples utilizing said fixed keys of said mechanical keyboard.

23. The cash settlement machine of claim 21, wherein said set of help mode display keys includes help editing display keys for editing said operational information, said help editing display keys include alpha character display keys.

24. The cash settlement machine of claim 17, wherein one of said plurality of
30 operational modes includes a diagnostic mode for displaying diagnostic information concerning said cash settlement machine on said graphics display and said mode-entry signals include a diagnostic mode-entry signal, said executing means executing said

instructions corresponding to said diagnostic mode upon receipt of said diagnostic mode-entry signal, said display key instructions instructing said graphics generator to generate a set of diagnostic mode display keys upon receipt of said diagnostic mode-entry signal.

25. The cash settlement machine of claim 24, wherein said set of diagnostics
5 mode display keys include touch screen test display keys for verifying the operability of said touch screen.

26. The cash settlement machine of claim 18, wherein one of said plurality of
operational modes includes a diagnostic mode for displaying diagnostic information
concerning said cash settlement machine on said graphics display and said mode-entry
10 signals include a diagnostic mode-entry signal, said executing means executing said
instructions corresponding to said diagnostic mode upon receipt of said diagnostic mode-
entry signal, said display key instructions instructing said graphics generator to generate a
set of diagnostic mode display keys upon receipt of said diagnostic mode-entry signal, said
set of diagnostic mode display keys including port test display keys for testing the
15 operability of said ports.

27. The cash settlement machine of claim 17, wherein one of said plurality of
operational modes includes a directory mode for searching headings of registers of said
memory and said mode-entry signals include a directory mode-entry signal, said executing
means executing said instructions corresponding to said directory mode upon receipt of
20 said directory mode-entry signal, said display key instructions instructing said graphics
generator to generate a set of directory mode display keys upon receipt of said directory
mode-entry signal, said set of directory mode display keys including alpha display keys for
selecting alpha characters to be searched.

28. The cash settlement machine of claim 17, wherein one of said plurality of
25 operational modes includes a directory mode for searching headings of registers of said
memory and said mode-entry signals include a directory mode-entry signal, said executing
means executing said instructions corresponding to said directory mode upon receipt of
said directory mode-entry signal, said display key instructions instructing said graphics
generator to generate a set of directory mode display keys upon receipt of said directory
30 mode-entry signal, said set of directory mode display keys including numerical display keys
for selecting numerical characters to be searched.

29. The cash settlement machine of claim 17, wherein one of said plurality of operational modes includes a screen format mode for modifying the manner in which said data is displayed on said graphics display and said mode-entry signals include a screen format mode-entry signal, said executing means executing said instructions corresponding to said screen format mode upon receipt of said screen format mode-entry signal, said display key instructions instructing said graphics generator to generate a set of screen format mode display keys upon receipt of said screen format mode-entry signal.

30. The cash settlement machine of claim 29, wherein said set of screen format mode display keys includes character moving display keys for moving operator selected data displayed on said graphics display.

31. The cash settlement machine of claim 29, wherein said set of screen format mode display keys includes font display keys for modifying fonts and font sizes of said data displayed on said graphics display.

32. The cash settlement machine of claim 18, wherein one of said peripheral devices is a printer and one of said plurality of operational modes includes a reports mode for printing said data from said cash settlement machine to said printer said mode-entry signals include a reports mode-entry signal, said executing means executing said instructions corresponding to said reports mode upon receipt of said reports mode-entry signal, said display key instructions instructing said graphics generator to generate a set of reports mode display keys upon receipt of said reports mode-entry signal.

33. The cash settlement machine of claim 32, wherein said instructions corresponding to said reports mode include pre-defined print formats, said set of reports mode display keys includes format display keys allowing said operator to choose a format of said data being sent to said printer from said pre-defined print formats.

34. The cash settlement machine of claim 33, wherein said set of reports mode display keys includes editing display keys for enabling an operator to edit said pre-defined print formats, said editing display keys including character movement display keys for moving said data in said pre-defined print formats on said graphics display.

35. The cash settlement machine of claim 18, wherein one of said peripheral devices is a personal computer and one of said plurality of operational modes includes a reports mode for downloading said data from said cash settlement machine to said personal computer, said display keys include a reports mode key and said mode-entry signals include

a reports mode-entry signal corresponding to said reports mode key, said executing means executing said instructions corresponding to said reports mode upon receipt of said reports mode-entry signal, said display key instructions instructing said graphics generator to generate a set of reports mode display keys upon receipt of said reports mode-entry signal.

5 36. The cash settlement machine of claim 17, wherein one of said plurality of operational modes includes a set-up mode for initializing said cash settlement machine, said display keys include a set-up mode key and said mode-entry signals include a set-up mode-entry signal corresponding to said set-up mode key, said executing means executing said instructions corresponding to said set-up mode upon receipt of said set-up mode-entry
10 signal, said display key instructions instructing said graphics generator to generate a set of set-up mode display keys upon receipt of said set-up mode-entry signal.

 37. The cash settlement machine of claim 36, wherein said fixed keys of said mechanical keyboard include variable function keys, said set of set-up mode display keys includes labeling display keys for labeling said variable function keys, said labeling display
15 keys including alpha character display keys.

 38. The cash settlement machine of claim 36, wherein said display keys have variable function display keys, said set of set-up mode display keys includes labeling display keys for labeling said variable function display keys, said labeling display keys including alpha character display keys.

20 39. The cash settlement machine of claim 36, wherein said memory includes a plurality of registers for storing said data, and wherein said set of set-up mode display keys includes labeling display keys for labeling said registers, said labeling display keys including alpha character display keys.

 40. The cash settlement machine of claim 36, wherein said set of set-up mode
25 display keys includes enable and disable display keys, said enable display key activating said input signal from an operator-selected fixed key, said disable display key deactivating said input signal from an operator-selected fixed key.

 41. The cash settlement machine of claim 36, wherein said set of set-up mode display keys includes enable and disable display keys, said enable display key activating
30 said input signal from an operator-selected display key, said disable display key deactivating said input signal from an operator-selected display key.

42. The cash settlement machine of claim 18, wherein one of said plurality of operational modes includes a set-up mode for initializing said cash settlement machine, said display keys include a set-up mode key and said mode-entry signals include a set-up mode-entry signal corresponding to said set-up mode key, said executing means executing
5 said instructions corresponding to said set-up mode upon receipt of said set-up mode-entry signal, said display key instructions instructing said graphics generator to generate a set of set-up mode display keys upon receipt of said set-up mode-entry signal, said set of set-up mode display keys includes port set-up display keys to establish communication links of said peripheral devices to said cash settlement machine.

10 43. A cash settlement station of claim 18, wherein one of said plurality of peripheral devices is a coin sorting machine.

44. A cash settlement station of claim 18, wherein one of said plurality of peripheral devices is a cash scanning and counting machine.

15 45. A cash settlement station of claim 18, wherein one of said plurality of peripheral devices dispenses money.

46. A method for operating a cash settlement machine having
a graphics display for displaying said data;
a touch screen mounted over said graphics display for providing input signals in response to manual actuation of said touch screen; and
20 a controller coupled to said touch screen and to said graphics display, said controller including

a graphics generator for generating display keys on said graphics display, each of said display keys positioned on said graphics display at a key display location, each of said input signals from said touch screen corresponding to manual
25 actuation of said touch screen above a respective one of said key display locations, flash memory for storing instructions for each of a plurality of operational modes, and

means for executing said instructions including display key instructions wherein said executing means instructs said graphics generator to generate said
30 display keys at said display key locations,
the method comprising the steps of:

displaying, under direction of said controller, said display keys on said graphics display associated with one of said plurality of operational modes;

actuating said touch screen at a position above one of said key display locations;

and

- 5 executing, under direction of said controller, instructions corresponding to said display key above which said touch screen was actuated.

47. The method of claim 46, wherein the plurality of modes include a basic operating mode, a help mode, a diagnostic mode, a directory mode, a set-up mode, a screen format mode, and a reports mode.

- 10 48. A method of cloning software from a first cash settlement machine to a plurality of other cash settlement machines, each of said cash settlement machines having a controller, and a resident memory containing an initial software code to be executed by said controller, said method of cloning software comprising the steps of:

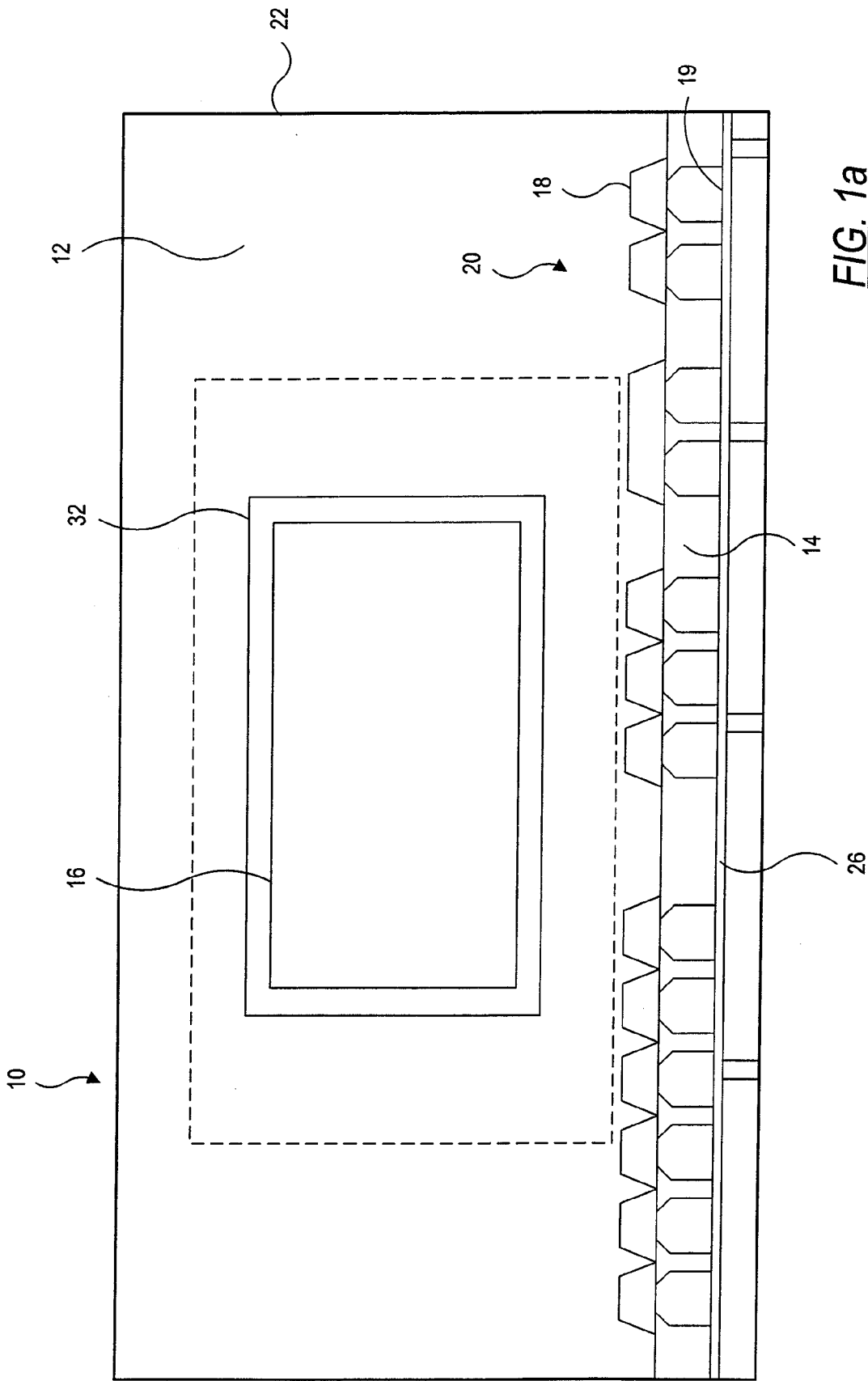
storing a second software code in a flash card memory contained within a flash card

- 15 remote from said cash settlement machine;

electrically coupling said flash card to the cash settlement machine to cause said resident memory to erase the initial software code and store the second software code; and

removing said flash card from the cash settlement machine, said resident memory of said cash settlement machine thereafter retaining the second software code.

- 20 49. The method of claim 48 comprising the further step of copying the contents of memory onto a flash card and subsequently using the flash card to introduce the identical code into another machine.



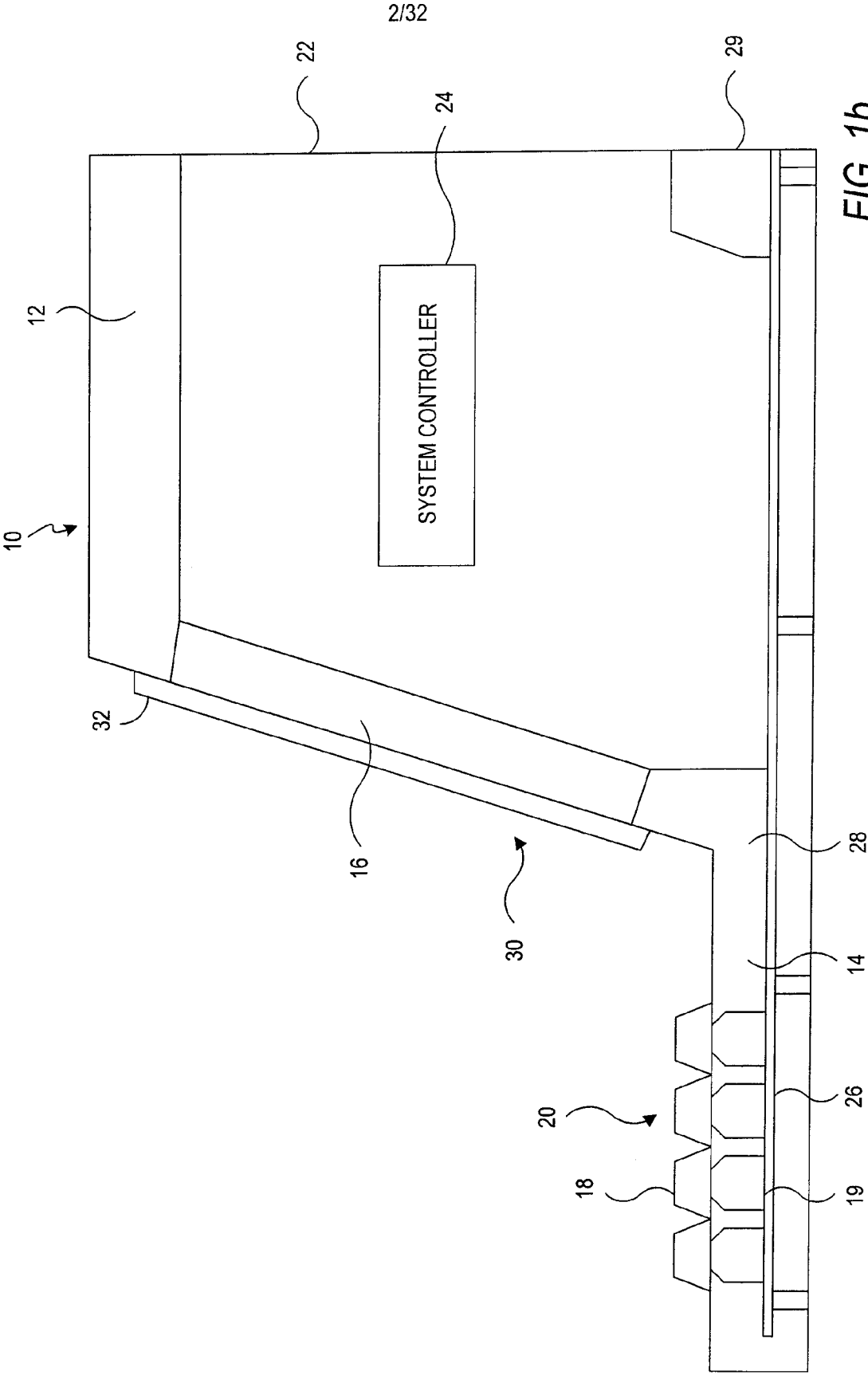


FIG. 1b

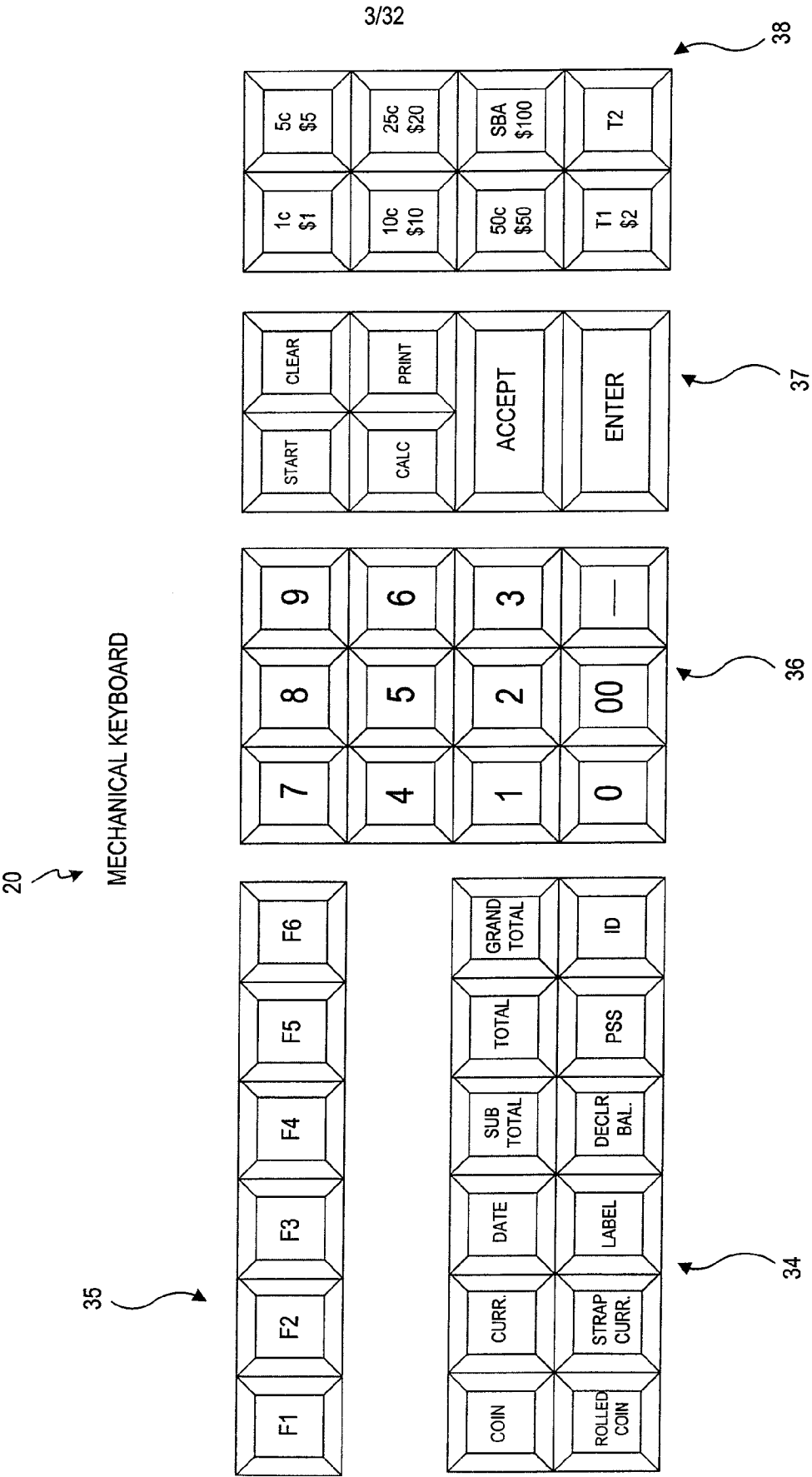
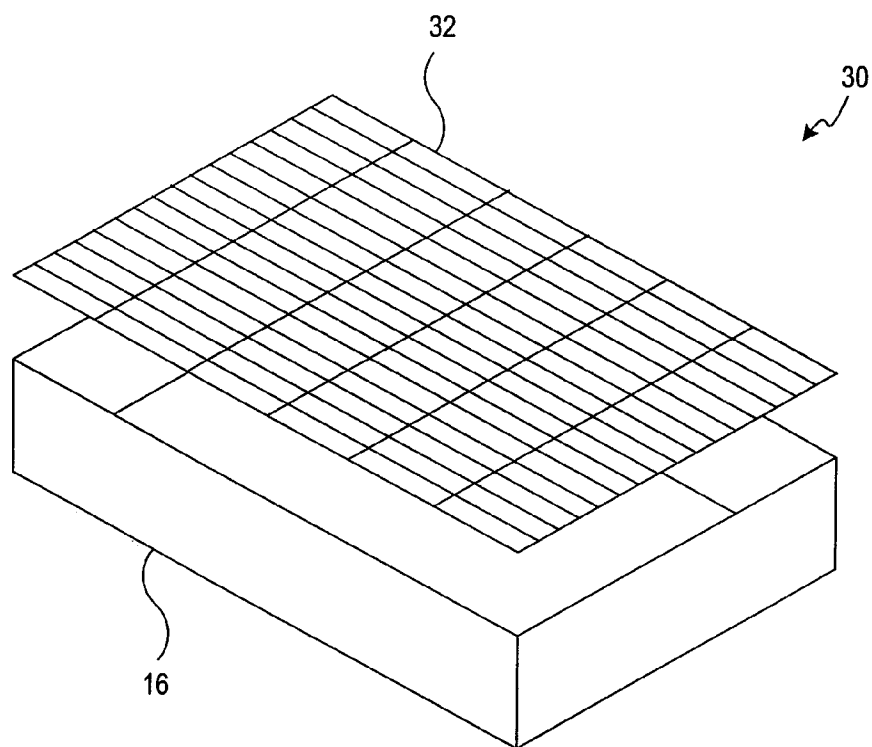
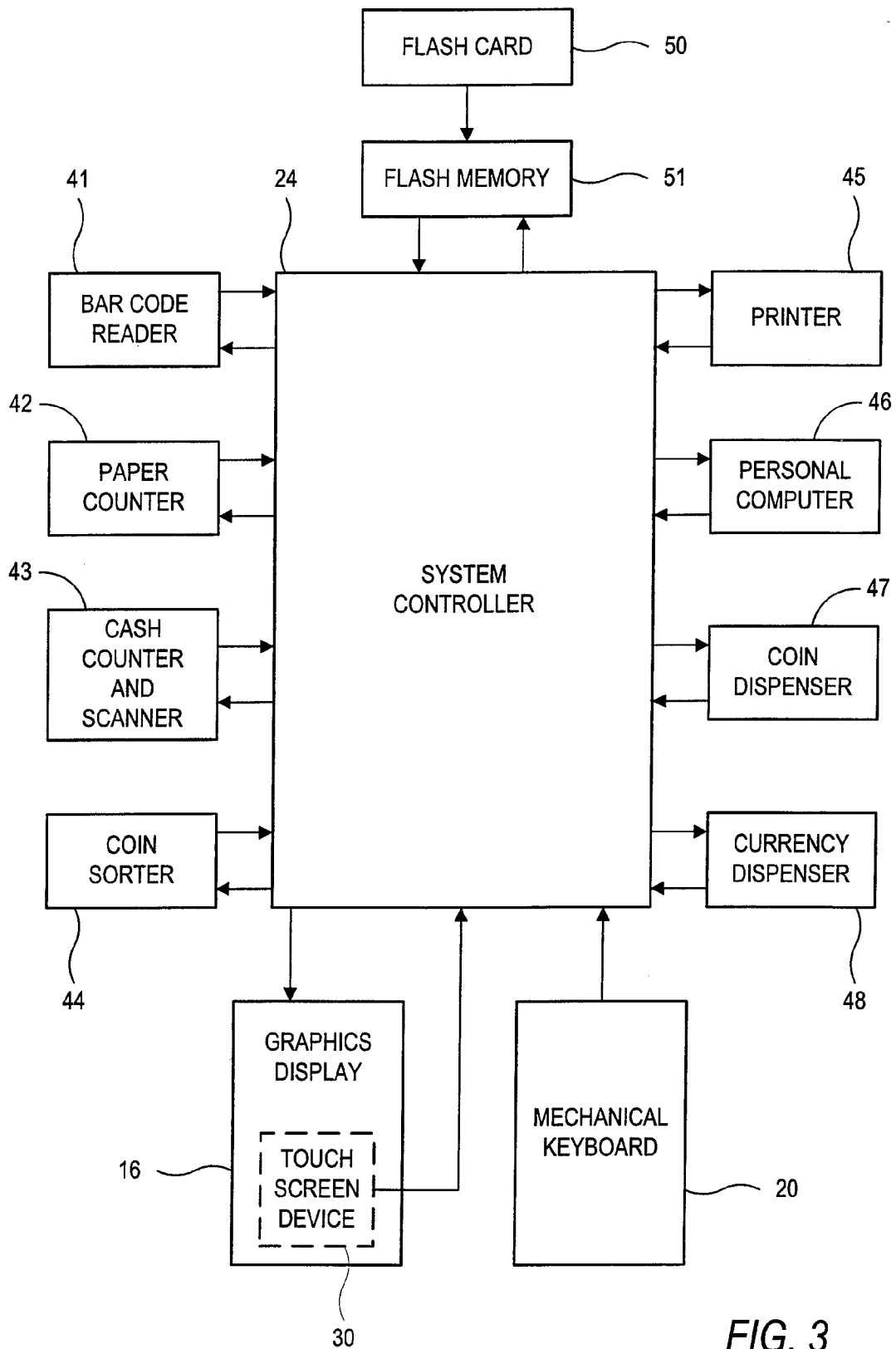


FIG. 2a

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**FIG. 2b**

5/32

**FIG. 3**

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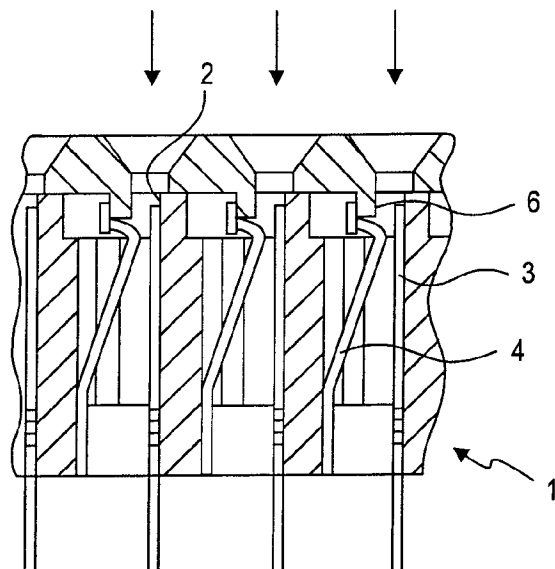


FIG. 4

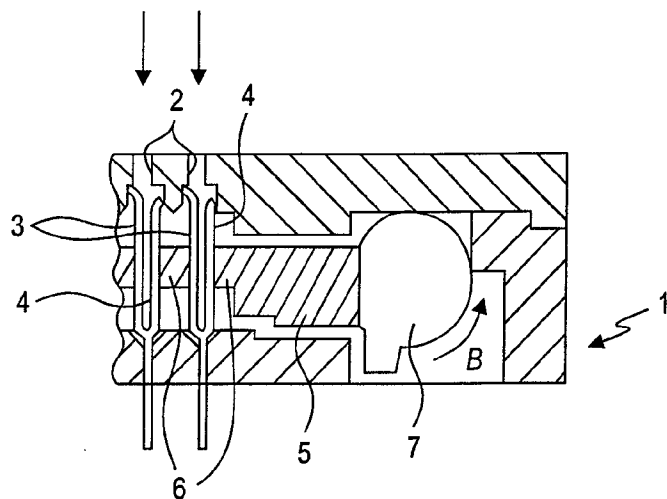


FIG. 5

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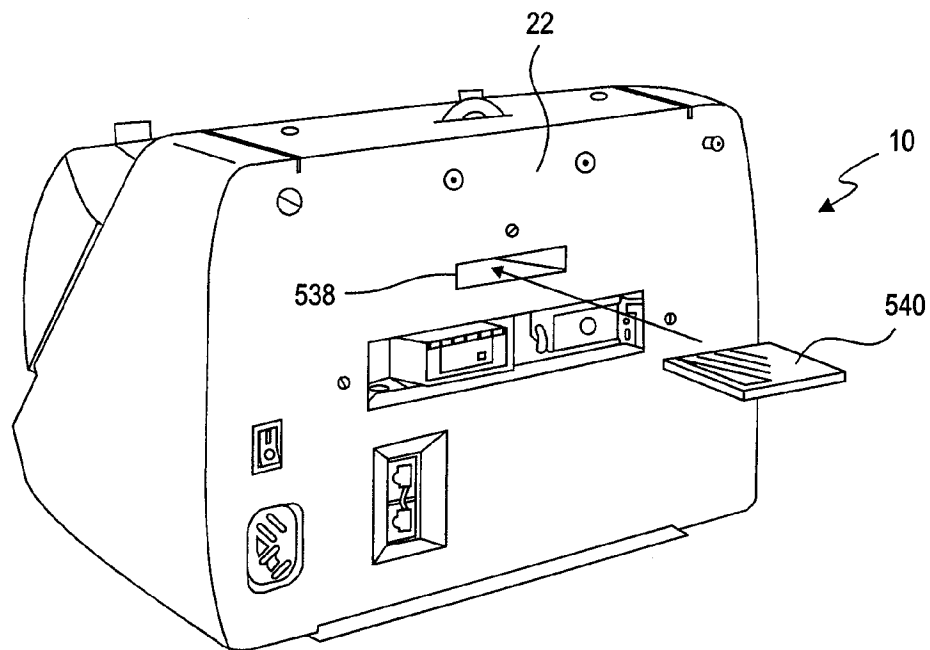


FIG. 6

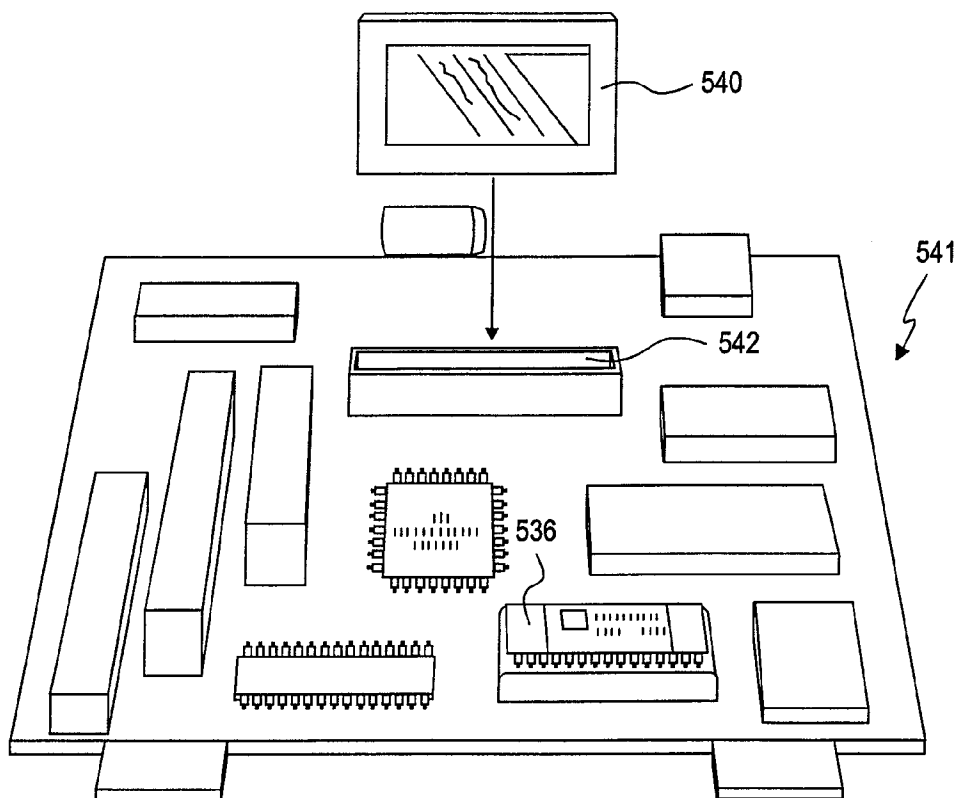
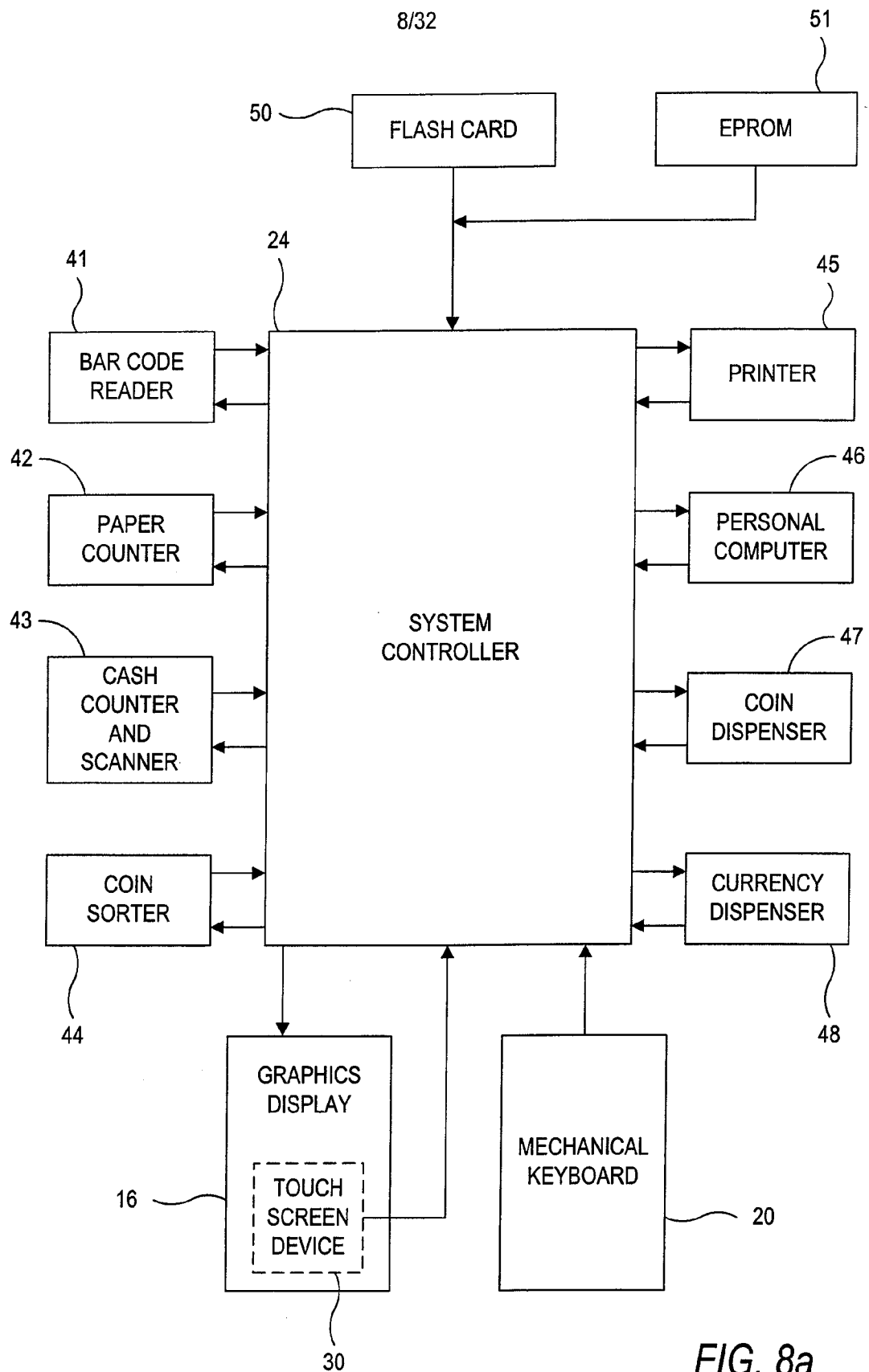


FIG. 7

**FIG. 8a**

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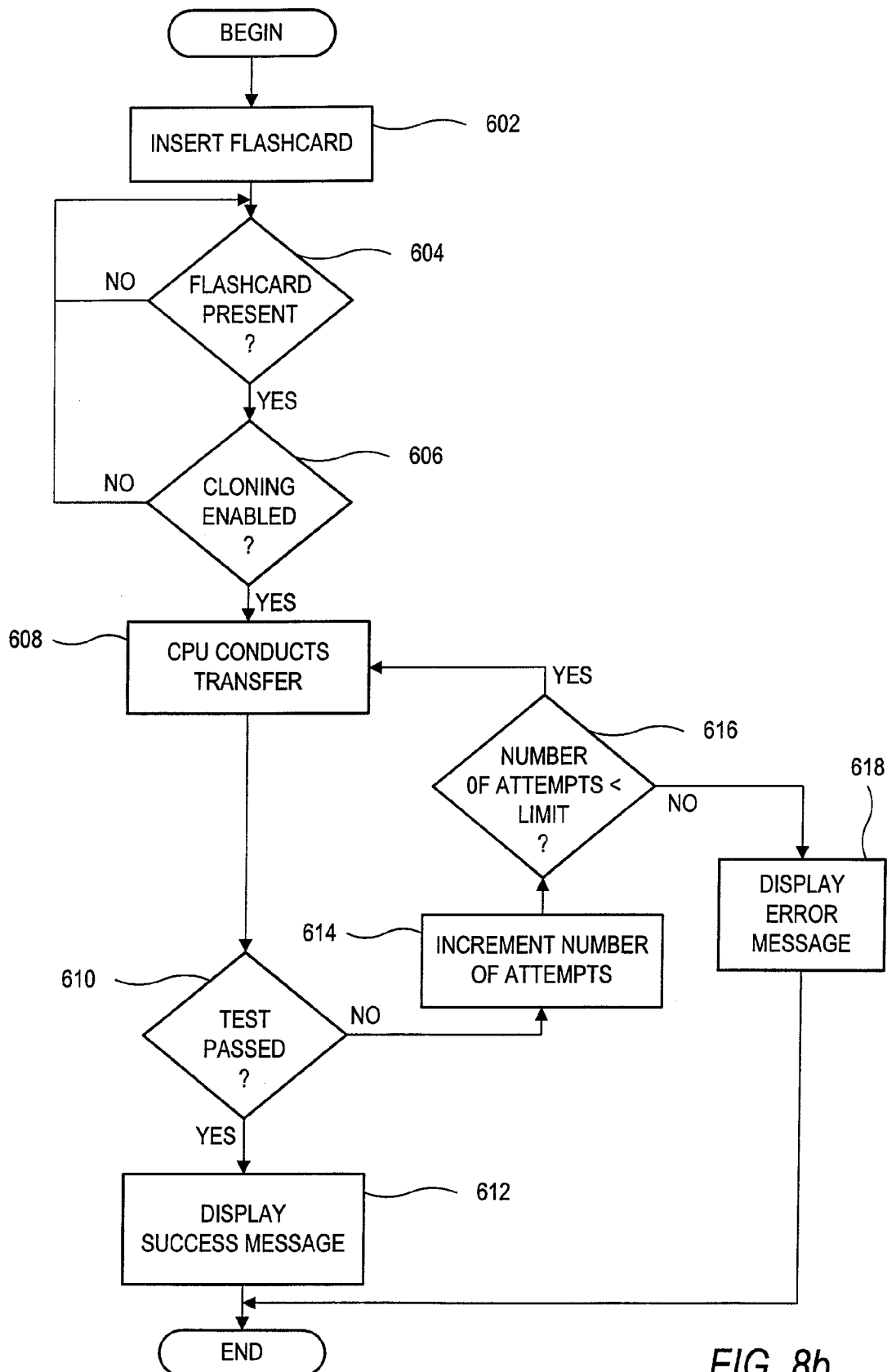
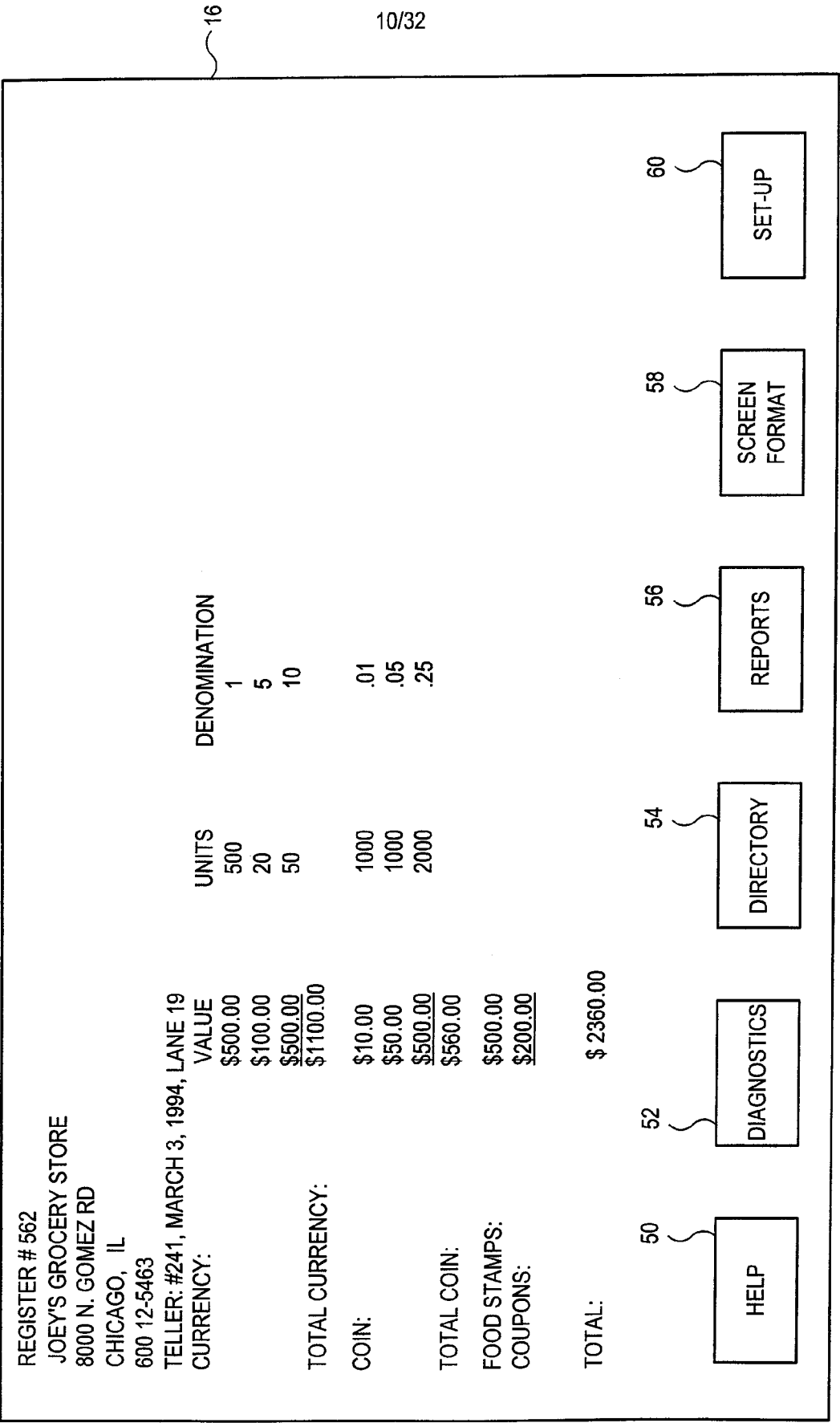


FIG. 8b



11/32

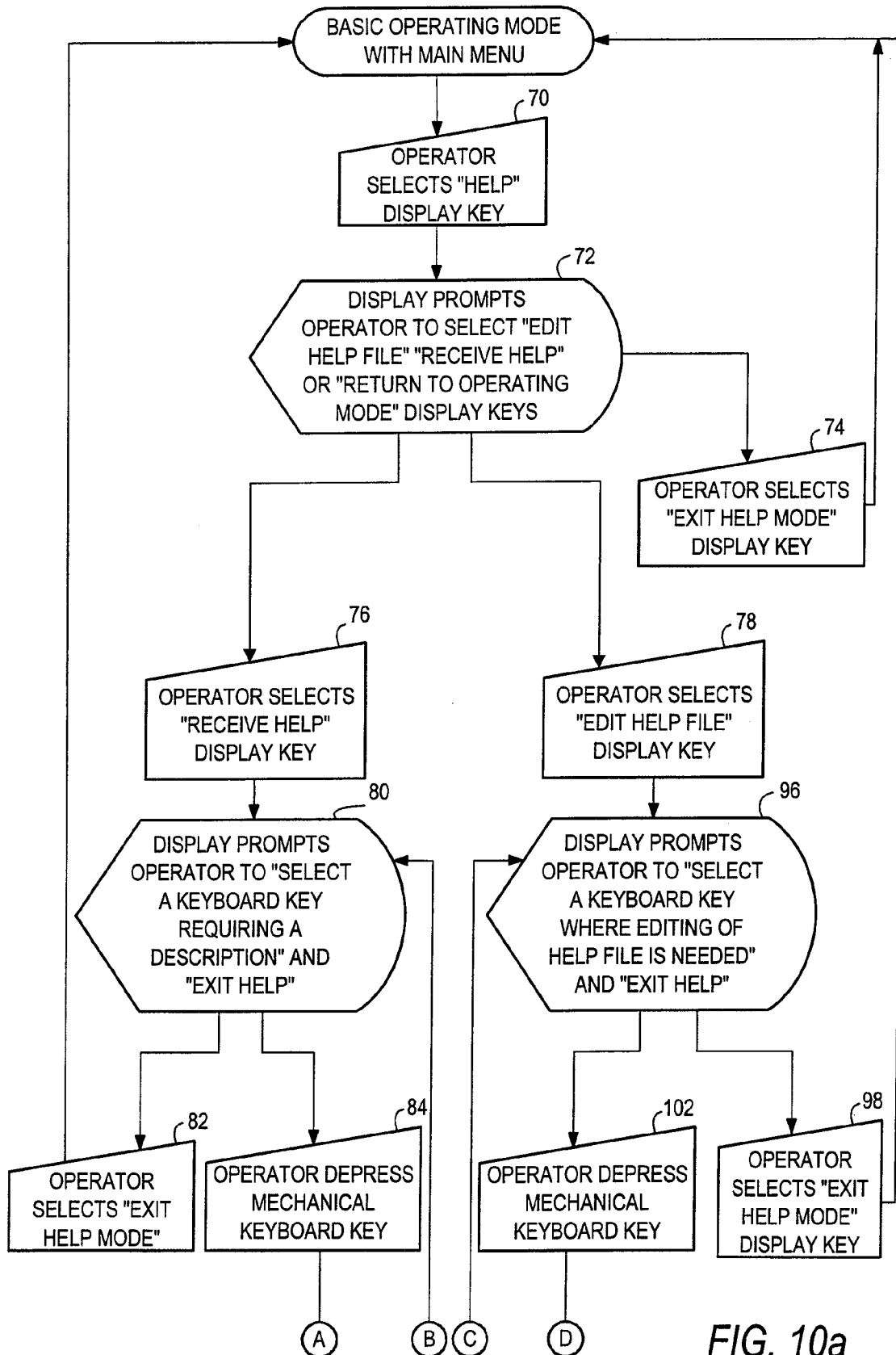
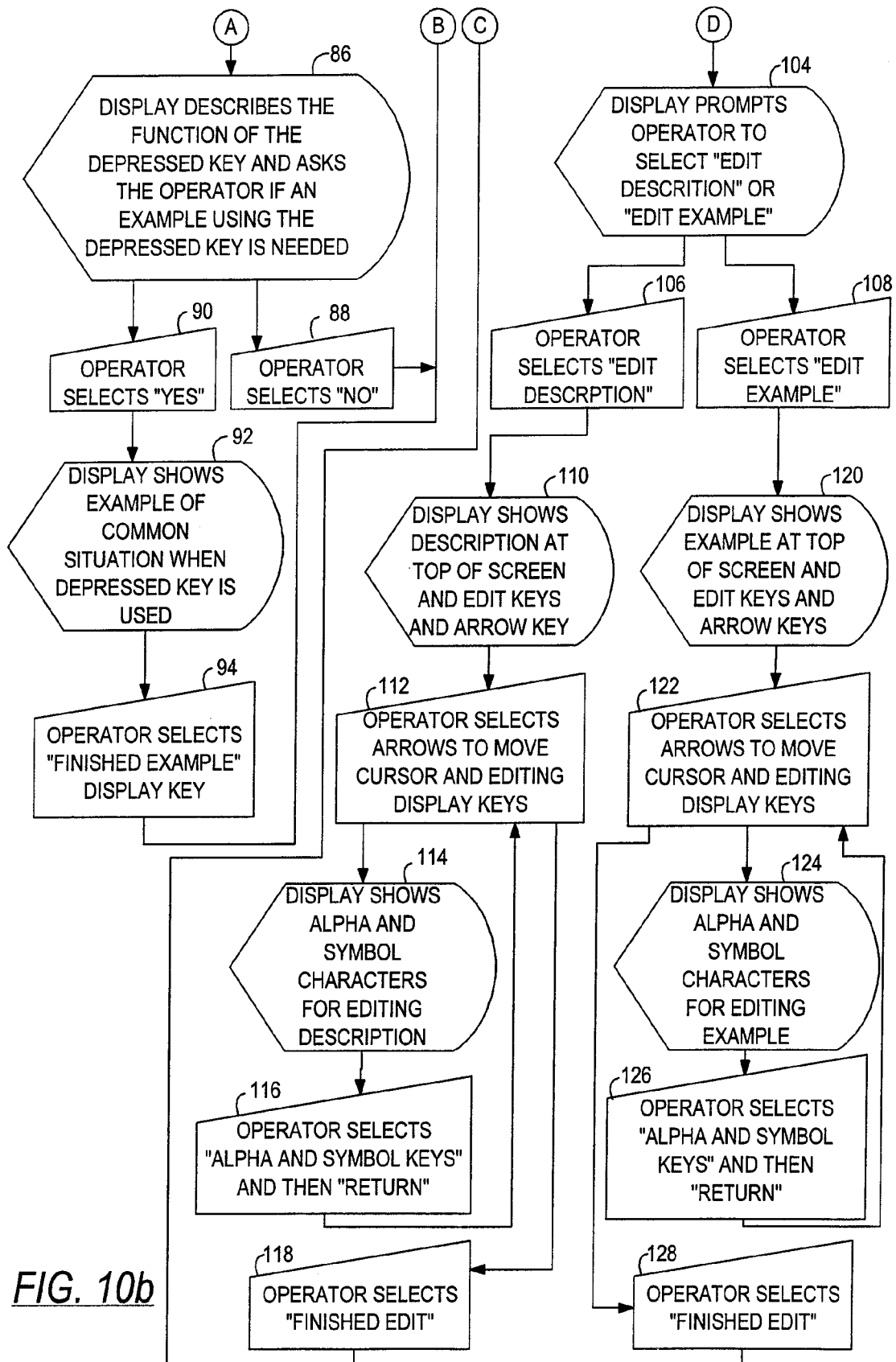


FIG. 10a

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13/32

16

YOU ARE EDITING THE (DESCRIPTION OR EXAMPLE) OF _____ KEY.
THE CURRENT (DESCRIPTION OR EXAMPLE) IS AS FOLLOWS:

THE PURPOSE OF THE _____ KEY IS TO.....

CURSOR →	CURSOR ←	INSERT	TYPEOVER	BACKSPACE	FINISHED EDIT
-------------	-------------	--------	----------	-----------	------------------

FIG. 11

16

ENTER CHARACTERS: THE PURPOSE OF THE _____ KEY...

a	b	c	d	e	f
g	h	i	j	k	l
m	n	o	p	q	r
s	t	u	v	w	x
y	z	SPACE	SYMBOL	SHIFT	RETURN

FIG. 12a

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16

ENTER CHARACTERS:

A	B	C	D	E	F
G	H	I	J	K	L
M	N	O	P	Q	R
S	T	U	V	W	X
Y	Z	SPACE	SYMBOL	SHIFT	RETURN

FIG. 12b

16

ENTER CHARACTERS:

!	@	#	\$	%	^
&	*	()	-	+
=	{	}	:	;	"
'	<	,	>	.	
?	/	SPACE	ALPHA		RETURN

FIG. 12c

15/32

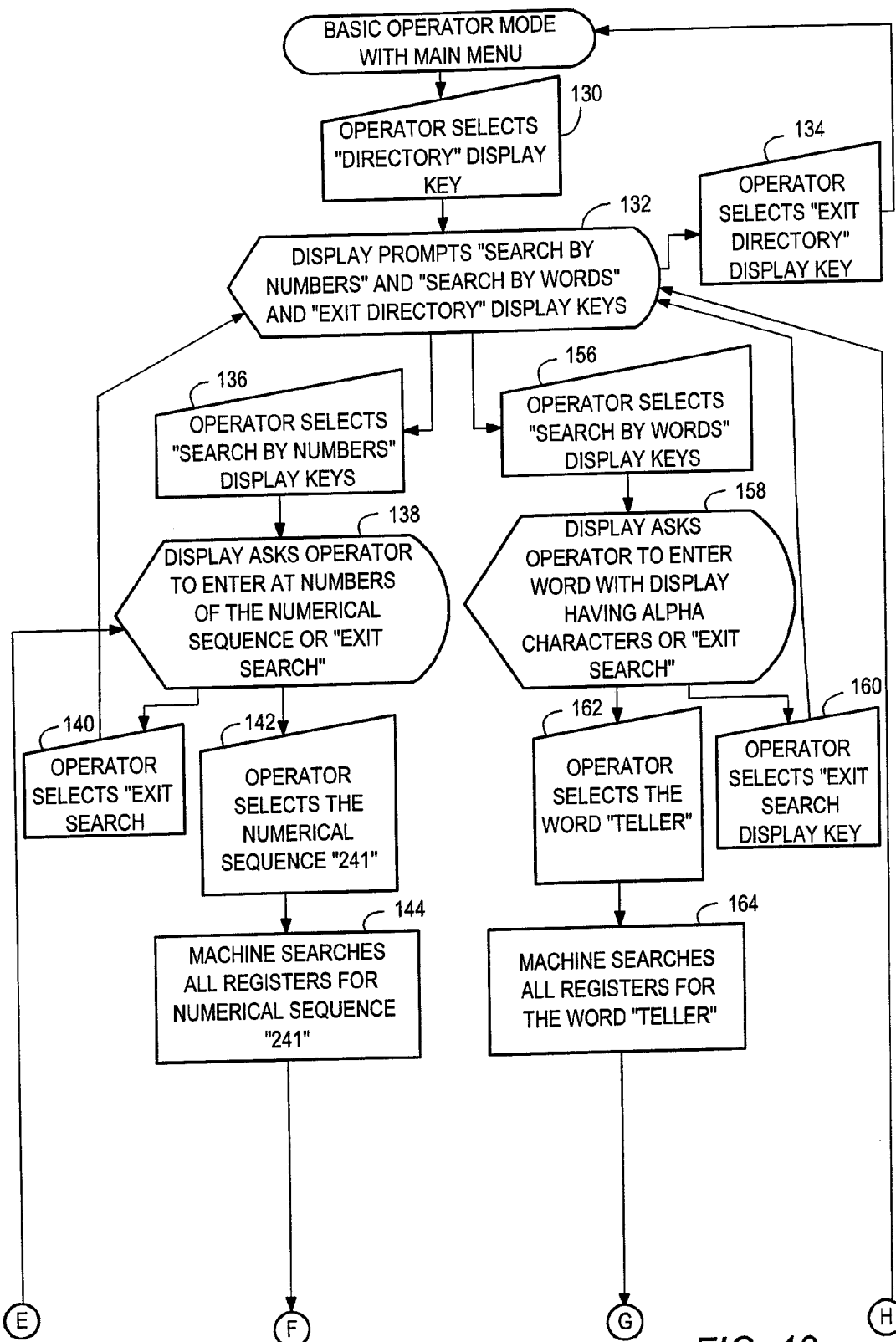


FIG. 13a

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16

THE FOLLOWING LIST OF REGISTERS CONTAINED THE NUMERICAL SEQUENCE "241" IN THEIR ID HEADER			
REGISTER			
21	TELLER: #241	APRIL 16, 1995	LANE 13
39	TELLER: #241	APRIL 17, 1995	LANE 17
314	CHECKER #1241	FEB. 21, 1994	SERVICE EXPRESS
315	CHECKER #1241	FEB. 22, 1994	SERVICE EXPRESS
497	CHECKER #1241	FEB. 28, 1994	SERVICE EXPRESS
561	TELLER: #241	FEB. 27, 1994	LANE 14
562	TELLER: #241	MARCH 3, 1994	LANE 19
739	BILL JOHNSON	241-62-3267	DEPOSIT TO BANK
840	BILL JOHNSON	241-62-3267	DEPOSIT TO BANK
841	TELLER: #241	APRIL 2, 1995	LANE 14

NEW
SEARCH OR
END

CURSOR
↑

CURSOR
↓

NEXT 10
REGISTERS

PREVIOUS
10
REGISTERS

VIEW
ENTIRE
REGISTER

FIG. 14

REGISTER # 562
JOEY'S GROCERY STORE
8000 N. GOMEZ RD
CHICAGO, IL
600 12-5463
TELLER: #241, MARCH 3, 1994, LANE 19
CURRENCY:

UNITS	VALUE	DENOMINATION
500	\$500.00	1
20	\$100.00	5
50	\$500.00	10
	<u>\$1100.00</u>	

TOTAL CURRENCY:

COIN:

1000	\$10.00	.01
1000	\$50.00	.05
2000	<u>\$500.00</u>	.25
	<u>\$560.00</u>	

TOTAL COIN:

FOOD STAMPS:

COUPONS:

TOTAL: \$ 2360.00

NEW SEARCH
OR END
SEARCH

RETURN TO
REGISTER
LIST

18/32

16

FIG. 15

16

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ENTER THE WORD(S) YOU WOULD LIKE SEARCHED IN
THE MEMORY REGISTER: "TELLER"

A	B	C	D	E	F
G	H	I	J	K	L
M	N	O	P	Q	R
S	T	U	V	W	X
Y	Z	SPACE			EXIT SEARCH

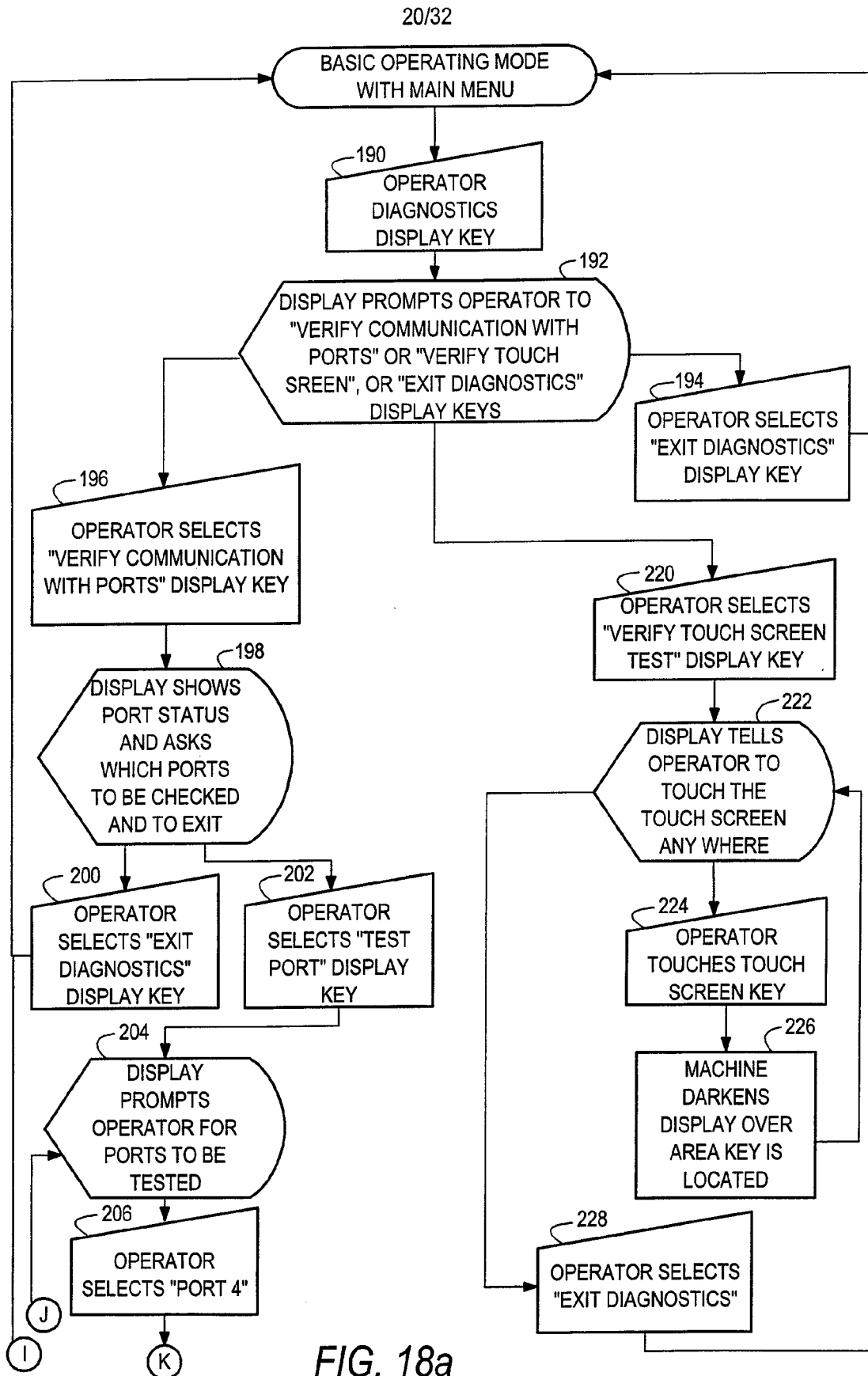
FIG. 16

16

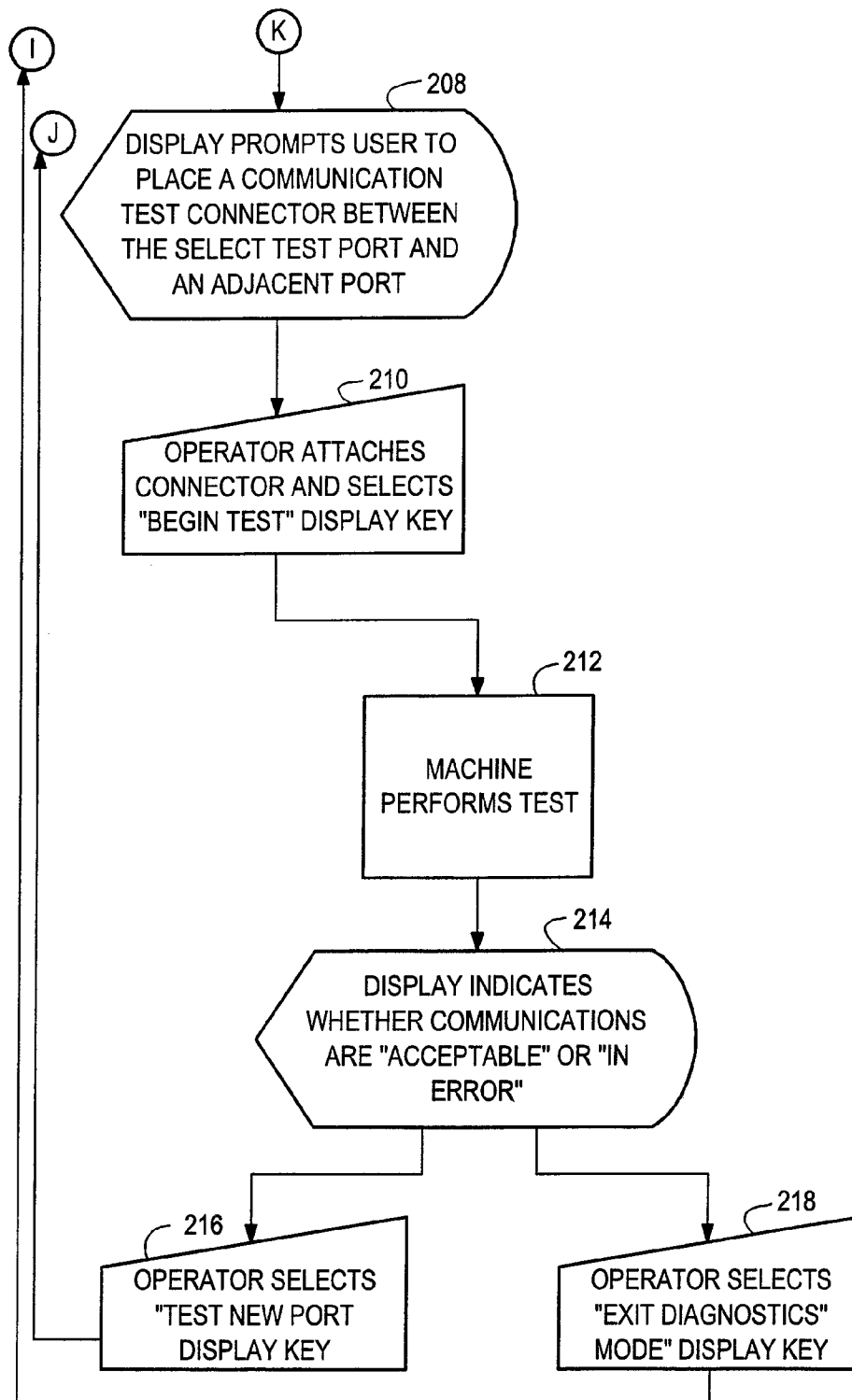
THE FOLLOWING LIST OF REGISTERS CONTAIN THE WORD "TELLER" IN THEIR ID HEADER			
REGISTER	ID HEADER		
21	TELLER: #241	APRIL 16, 1995	LANE 13
39	TELLER: #241	APRIL 17, 1995	LANE 17
314	TELLER: #617	FEB. 21, 1994	SERVICE EXPRESS
315	TELLER: #312	FEB. 22, 1994	SERVICE EXPRESS
497	TELLER: #391	FEB. 28, 1994	SERVICE EXPRESS
561	TELLER: #241	FEB. 27, 1994	LANE 14
562	TELLER: #241	MARCH 3, 1994	LANE 19
739	TELLER: #391	241-62-3267	DEPOSIT TO BANK
840	TELLER: #312	241-62-3267	DEPOSIT TO BANK
841	TELLER: #241	APRIL 2, 1995	LANE 14

NEW SEARCH OR END	CURSOR ↓	CURSOR ↑	NEXT 10 REGISTER	PREVIOUS 10 REGISTER	VIEW ENTIRE REGISTER
-------------------------	-------------	-------------	---------------------	----------------------------	----------------------------

FIG. 17



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*FIG. 18b*

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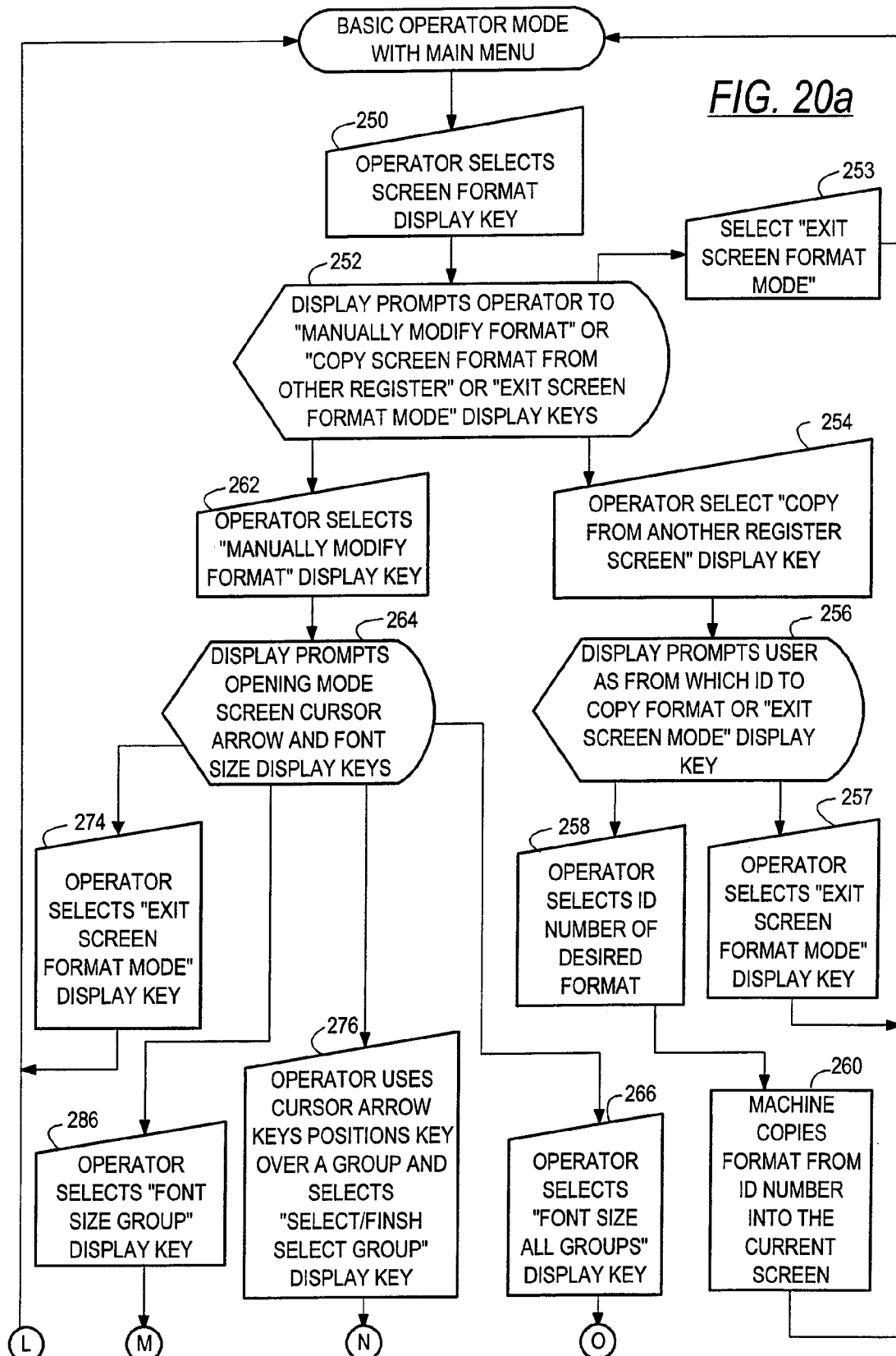
16

PORT STATUS:				
<u>PORT</u>	<u>PERIPHERAL</u>	<u>BAUD</u>	<u>DATA</u>	<u>PARITY</u>
1	PRINTER	9600	8 BIT	NONE
2	JET SCANNER	9600	8 BIT	EVEN
3	JET SORTER	4800	8 BIT	ODD
4	OFF			
5	OFF			
6	BAR CODE WARD	4800	7 BIT	ODD
7	COIN DISPENSOR	9600	8 BIT	EVEN
8	CURRENCY DISPENSOR	9600	7 BIT	ODD
TEST PORT		EXIT DIAGNOSTICS MODE		

FIG. 19

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FIG. 20a



24/32

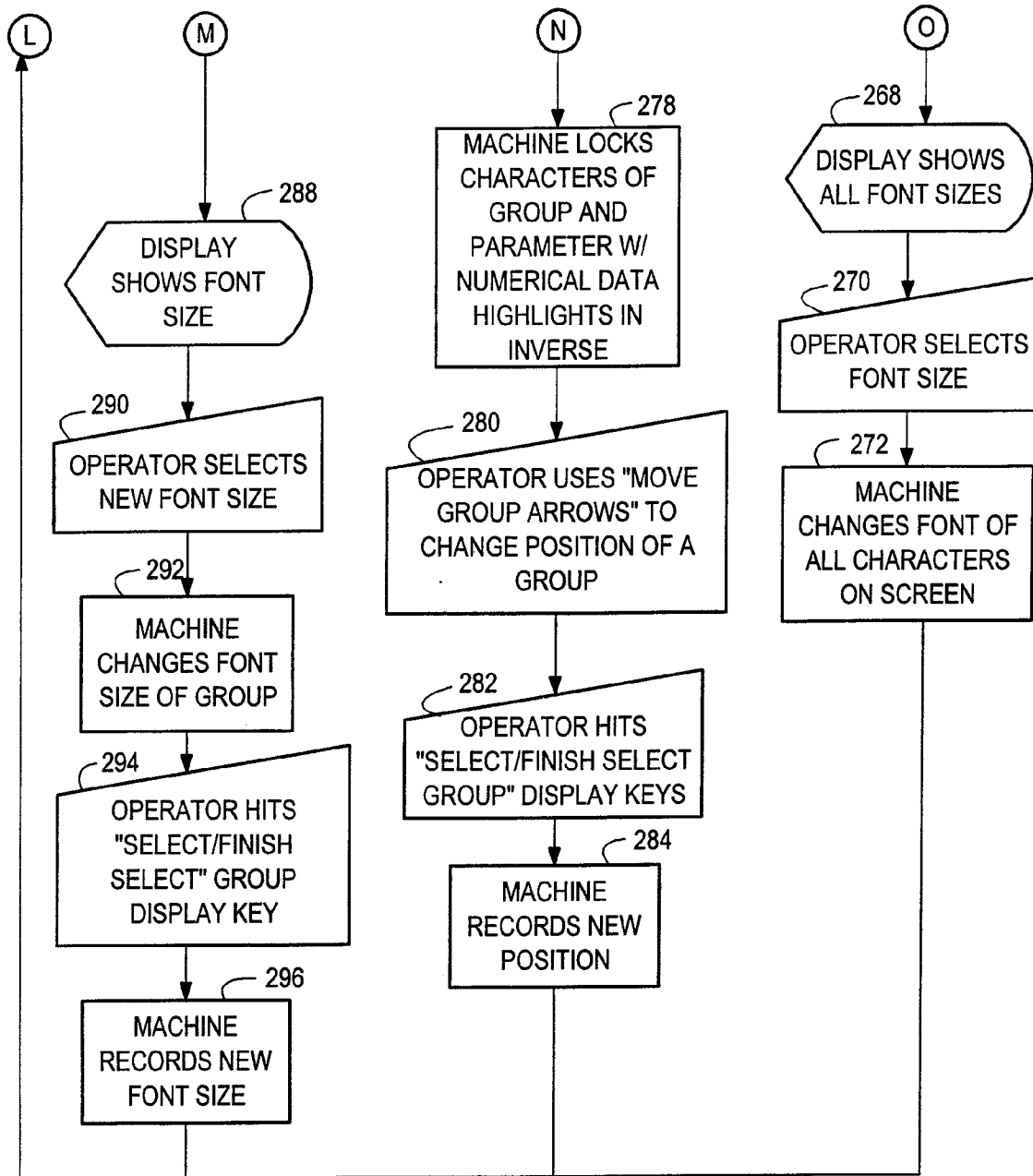


FIG. 20b

REGISTER ID: 427
TELLER #394:
CHECK OUT LANE #13
APRIL 29, 1995

CASH	TOTAL	DENOMINATION	NUMBER
	\$ 120	\$20	6
	50	\$10	5
	5	\$ 5	1
	<u>13</u>	\$ 1	13
TOTAL CASH	\$ 188		
COIN	\$ 1.00	\$ 0.25	4
	2.00	\$ 0.10	20
	0.05	0.05	1
	<u>0.03</u>	0.01	3
TOTAL COIN	\$ 3.18		

CURSOR
←

CURSOR
→

MOVE
GROUP
←

MOVE
GROUP
→

SELECT/
FINISH
SELECT
GROUP

FONT SIZE
ALL GROUP

CURSOR
↑

CURSOR
↓

MOVE
GROUP
↑

MOVE
GROUP
↓

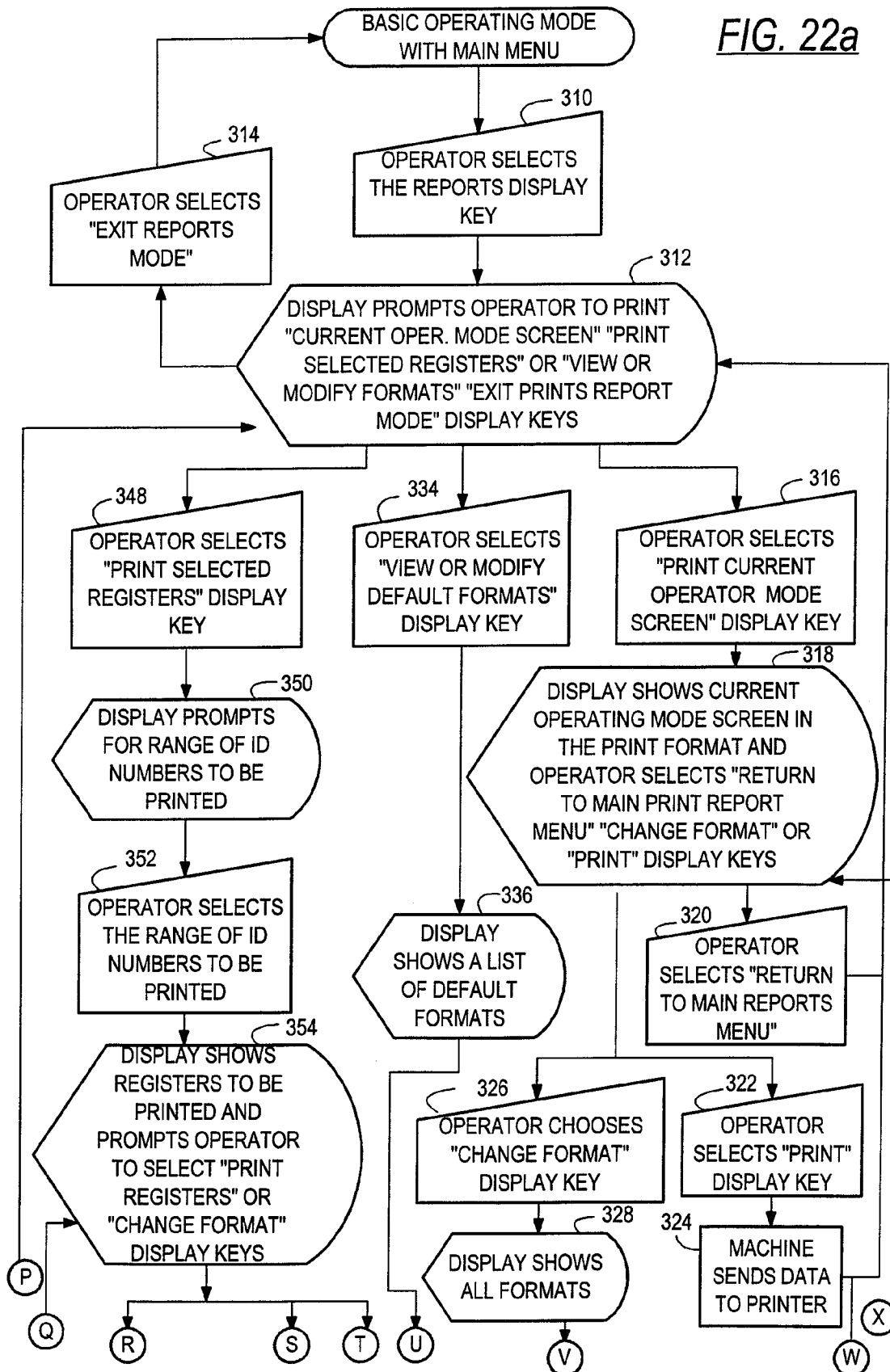
FONT SIZE
GROUP

EXIT
SCREEN
FORMAT
MODE

FIG. 21

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FIG. 22a



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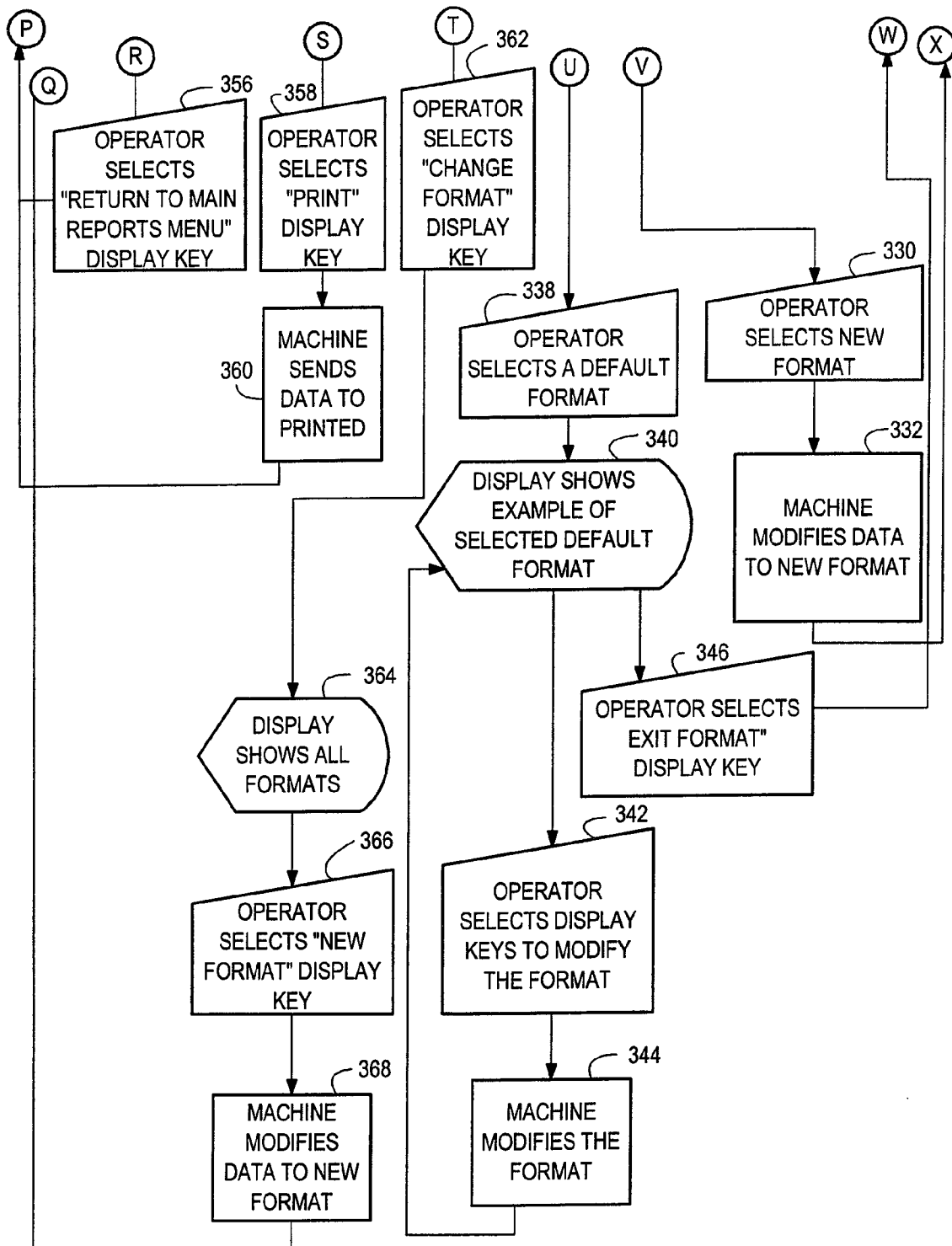


FIG. 22b

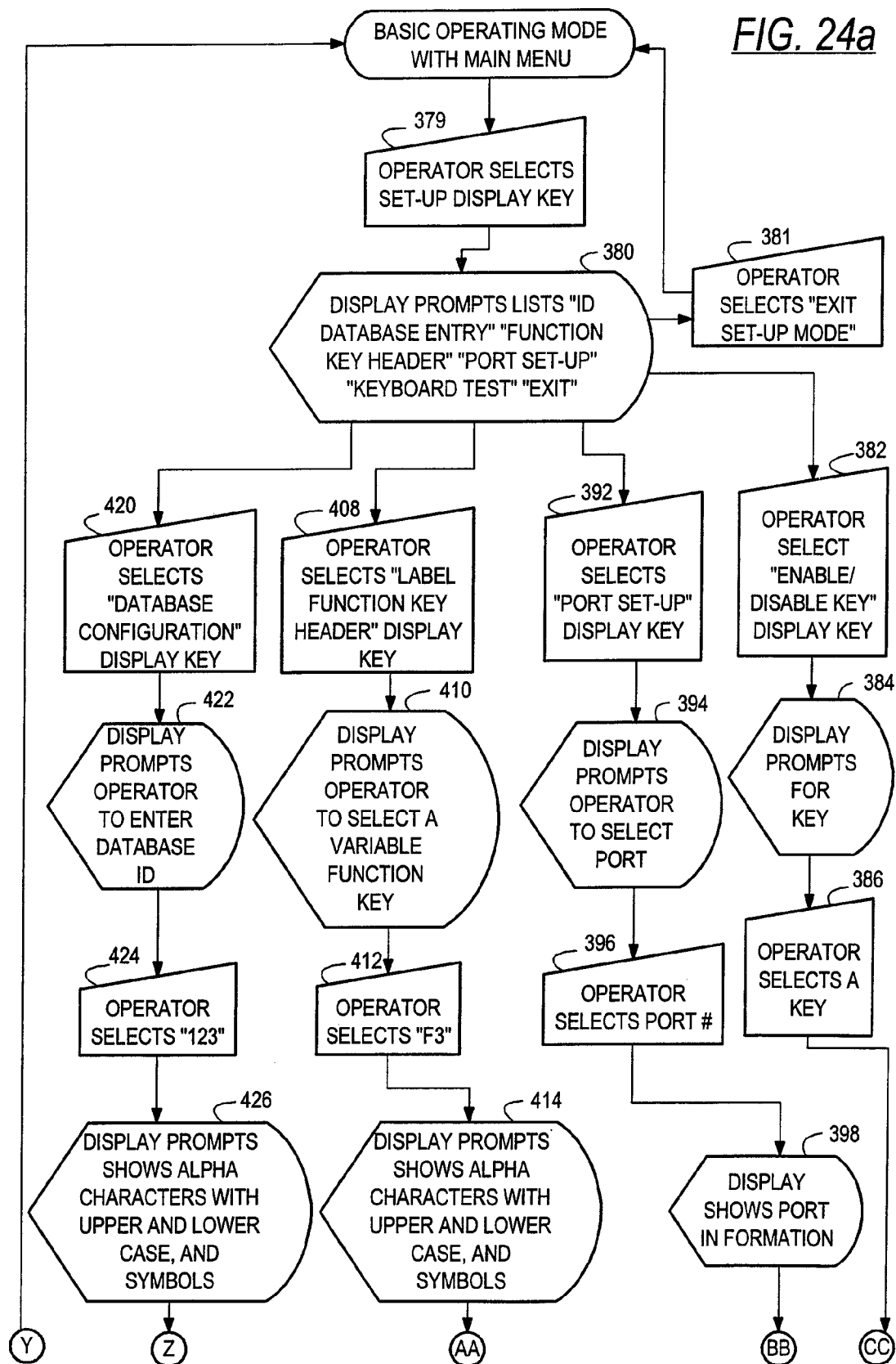
16

BASIC PRINT												FORMAT												#2																																				
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2																																																												
L1																																					REMOVE LINE																							
L2													TOTAL												DENOMINATION												NUMBER												ADD LINE											
L3	CASH												T1												D1												NT																							
L4													T2												D2												N2																							
L5													T3												D3												N3												REMOVE SPACE											
L6													T4												D4												N4												ADD SPACE											
L7	TOTAL CASH												T5																																															
L8	COIN												CT1												CD1												CN1												SCROLL UP											
L9													CT2												CD2												CN2												SCROLL DOWN											
L10													CT3												CD3												CN3																							
L11													CT4												CD4												CN4												EXIT FORMATS											

FIG. 23

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FIG. 24a



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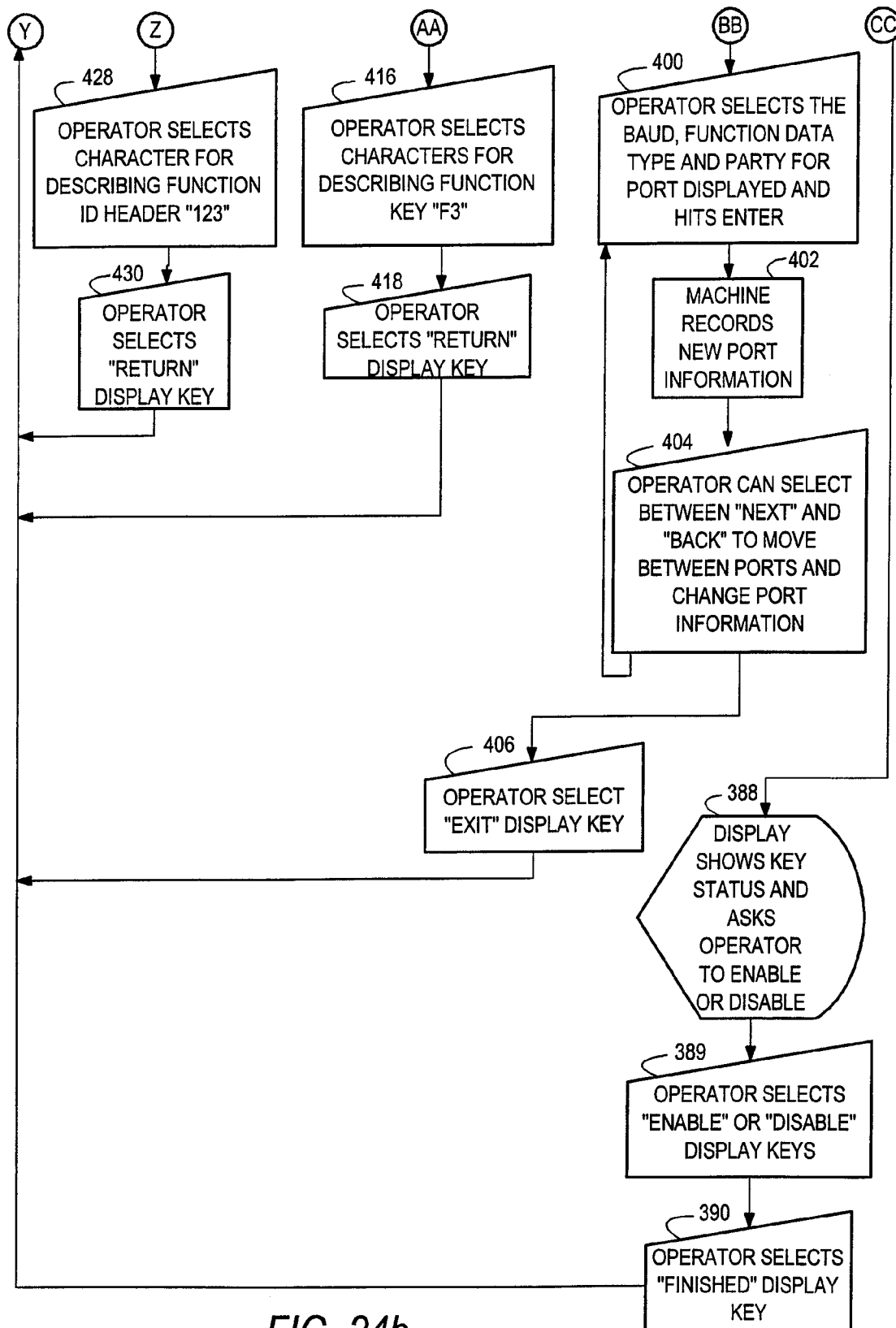


FIG. 24b

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** PORT 1 SETUP **

FUNCTION:	OFF	PRINTER	COMM	JTSRT	WAND
	JTSCN	JTCNT	ENCDR	CURDSP	CNDSP
BAUD:	600	1200	2400	4800	9600
DATA:	7	8		NEXT	BACK
PARITY:	ODD	EVEN	NONE		EXIT

FIG. 25

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		1C	5C												
		\$1	\$5												
		10C	25C												
		\$10	\$20												
		50C	5BA												
		\$50	\$100												
		T1	T2												
		\$2													
		FOREIGN CURRENCY													
HELP		DIAGNOSTICS		DIRECTORY		REPORTS		SCREEN FORMAT		SET-UP					
F1 COUPONS	F2 CHECKS	F3 CREDIT CARD	F4 ATM CARD	F5 DISABLED	F6 DISABLED	SESSION	CLEAR	7	8	9					
COIN	CURR	DATE	SUB TOTAL	TOTAL	GRAND TOTAL	VERIFY	ACCEPT	4	5	6					
ROLLED COIN	STRAP CURR	LABEL	DECLR BAL.	PSS PBB	ID	ENTER		1	2	3					
								0	00	-					

FIG. 26

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/18095

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06F 09/445, 07/00

US CL : 395/712; 705/030

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 395/712; 705/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 301 916 A (JACOBSON) 18 December 1996, pages 28-41	17-47
-----		-----
Y		1-16, 48-49
Y	US 5,410,707 A (BELL) 25 April 1995, Figures 1 and 3, Col. 4, lines 9-43, Col. 8, line 60 to Col. 9, line 11, Col. 10, lines 38-54	1-16, 48-49
Y	US 5,489,217 A (SCHEITZ et al.) 06 February 1996, Figures 4-7	4-8, 14-15
Y	US 5,276,903 A (SHINAGAWA) 04 January 1994, Col. 2, lines 3-15	49
A	US 4,532,641 A (NISHIMURA) 30 July 1985	
Y	US 5,386,369 A (CHRISTIANO) 31 January 1995, Figure 6, Col. 3, lines 26-37	5-8, 11



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	* T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
* A* document defining the general state of the art which is not considered to be of particular relevance	* X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
* E* earlier document published on or after the international filing date	* Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
* L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	* &* document member of the same patent family
* O* document referring to an oral disclosure, use, exhibition or other means	
* P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

16 DECEMBER 1998

Date of mailing of the international search report

08 FEB 1999

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
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INTERNATIONAL SEARCH REPORTInternational application No.
PCT/US98/18095**Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Please See Extra Sheet.

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/18095

B. FIELDS SEARCHED

Electronic data bases consulted (Name of data base and where practicable terms used):

APS, DERWENT, IEEE

search terms: cash settlement machine, system, device and station, flash card and memory, ZIF socket, touch screen, virtual keyboard, software or program loading or installing

BOX II. OBSERVATIONS WHERE UNITY OF INVENTION WAS LACKING

This ISA found multiple inventions as follows:

This application contains the following inventions or groups of inventions which are not so linked as to form a single inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I, claim(s) 1-16 and 48-49, drawn to a method and system for software loading.

Group II, claim(s) 17-47, drawn to a cash settlement machine and a method for operating the cash settlement machine.

The inventions listed as Groups I-II do not relate to a single inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the first inventive group deals with loading software onto a machine and the other inventive group deals with a touch display for a cash settlement machine.